"InDIAs": Innovative Retirement Security Bonds for India

by

Dr. Arun S. Muralidhar

(First Draft: June 1 2023; this draft June 17, 2023) ©

Abstract

A commonly-accepted retirement goal for a healthy pension is for it to sustain the relatively higher standard-of-living of the latter part of one's working life throughout retirement. A recent innovation implemented by Brazil in January 2023 might provide a solution to the pension challenges faced by India, and, more importantly, satisfy the key goals identified by the Reserve Bank of India in respect of debt management and a stable debt structure as also self- reliance and financial inclusion identified by the Government of India. We recommend India create and issue an innovative new bond: – Inflation-linked, Deferred-Income, Annuity-like Securities (InDIAs), known previously as SeLFIES. InDIAs is a single, simple, liquid, low-cost, relatively low-risk (government-issued) instrument that is easy to understand for even the most financially unsophisticated individual because it matches the desired real retirement income profile of individuals and embeds accumulation, decumulation, compounding, and inflation-adjustments. This paper also demonstrates how it achieves self-reliance (Aatmanirbhar) and leverages Jan Dhan accounts to improve financial inclusion via digitalization.

Keywords: Retirement Bonds, SeLFIES, InDIAs, Financial Literacy, Second-Pillar Pensions, Old Pension Scheme (OPS), New Pension Scheme (NPS), Financial Innovation, Increasing Coverage, Digitalization, Aatmanirbhar, Financial Inclusion, JanDhan

JEL Classification: G50, G51, G52, G53

"The future depends on what we do in the present." Mahatma Gandhi[1]

Introduction – The Global Retirement Challenge

The traditional three pillars of retirement security - state-provided Pay-as-You Go (PAYG) Social Security (SS), employer-provided defined benefits (DBs) or defined contributions (DCs), and private DC savings – are teetering on the brink of trouble for a number of similar reasons. Simply worded, these systems have been either underfunded (with weak funding mechanisms) or impacted by sub-optimal investment decisions (i.e., mismatched assets to liabilities or use of incorrect financial instruments as the "safe" asset). Individuals will probably experience one or more of the following bad options: (a) retire poor; (b) have to postpone retirement; and (c) work part-time in retirement (to generate income). The protests in France (in 2023) over the raising of the retirement age demonstrate how unappealing postponing retirement is to individuals. Regardless, without some major improvements in retirement systems, it is highly likely that many individuals globally will still have to be bailed out by governments. This additional burden on governments would come at an inopportune time as debt-to-GDP levels are high and many economies are experiencing slow to moderate growth. Countries as diverse as Brazil, France, India, Italy, and the Netherlands have already made pension reform a key topic to address in order to change that trajectory.

The causes of this looming crisis are multi-faceted (Muralidhar 2018a). In this paper, we focus attention on improving the environment for investing in DC plans, specifically in India, which is not only at the critical turning point of seeking to ensure self-reliance (Aatmanirbhar[2]), but is also aspiring for financial inclusion through digitalization (JanDhan accounts[3]), while striving to improve retirement security and funding infrastructure and green investments. The PAYG SS DB and employer DB systems are typically underfunded – i.e., the accumulation, if any, is insufficient for the retirement promises made and cannot foster economic development. In the case of SS, these DB schemes were (largely) funded through the PAYG mechanism, whereby the young are taxed to pay off the old. In India, the Old Pension Scheme (OPS) was an example of such a PAYG DB

[1] https://parade.com/1247073/marynliles/gandhi-quotes/.
[2] https://aatmanirbharbharat.mygov.in/
[33] https://pmjdy.gov.in/scheme

scheme for certain government employees (and was repealed in 2004).[4] As Modigliani and Muralidhar (2004) demonstrated, this method of funding SS puts the scheme in jeopardy as PAYG contributions are highly sensitive to changes in demographics or productivity. These factors have negatively impacted SS systems globally and will continue to do so for the foreseeable future. Given the widespread interest in the role of a public pension system, Merton (1983) proposed the creation of an innovative, mandatory, fully-funded, public DC system that was different from traditional models considered at that time (and probably since). Modigliani and Muralidhar (2004) recommend converting PAYG systems to partially funded systems (and retaining the DB), and intelligent investment of assets (i.e., tied to benefits promised and what is feasible in markets). Both recommendations have been ignored, and some countries, like Chile, privatized SS, moving individuals into a traditional DC scheme. As the first generation of participants approaches retirement, many of these countries are realizing that current DC schemes do not provide adequate and/or secure retirement income, leading to social unrest exactly as Modigliani and Muralidhar (2004) had warned; and, in many cases, the previous reform is being rolled back (e.g., Chile).

Employer-based (private sector) DB plans have also suffered badly, especially with the bursting of the dotcom technology bubble in 2000-2002, and the Great Financial Crisis (GFC) in 2008. The average funded status – or assets divided by liabilities at market prices – of these plans, fell below 100% in most countries, and some countries considered reductions in pensions, leading to protests (Cumbo and Wigglesworth 2019), or transformation to some form of DC or Collective DC (CDC in the UK and Netherlands). Given that sponsors continue to fall short of their committed contributions to their pension funds (due to the tough economic environment), DB pension funds are unlikely to achieve full funding anytime soon, and expectations of future asset returns are weak. In part, the funding difficulties in DB plans were caused by insufficient contributions, poor investment approaches that did not match assets to liabilities (e.g., the improper application of Modern Portfolio Theory or MPT, as noted in Muralidhar 2019b, or mispricing of risk, as noted in Merton 2007), and the inability to correctly forecast future returns. While it is proven that DB plans provide for an inter- and intra-generational sharing of risks, along with a backstop through a sponsor, thereby protecting the current retiree generation from asset-liability mismatches and low

[4] https://en.wikipedia.org/wiki/Old_Pension_Scheme

funded status. sadly, they do not safeguard future generations and the sponsor who may have to bear an undue burden.

Increasingly, companies and government entities are no longer providing DB plans, but are transferring the entire retirement risk to the individual via DC plans (or to private savings, which have the same risk profile as a DC plan). This would be the National Pension System in India or NPS.[5] Several snags arise with the transfer of retirement planning decisions to individuals (Muralidhar 2018a) beyond the fact that they are largely financially unsophisticated (Klapper et al 2015). First, many earning individuals are not saving enough, i.e., they are grossly underestimating how much they need for retirement.[6] Second, there is insufficient coverage of individuals – i.e., people either not being offered a plan, especially informal (e.g., maids, taxi drivers) or day laborers, or being offered one and not participating. Third, and the most harmful drawback, even for the sophisticated investor, let alone the unsophisticated participants, is that many are investing their assets poorly to achieve their goals. Further, planning for retirement requires forecasting inflation to preserve one's standard-of-living, and this is beyond the capabilities of even sophisticated individuals. These challenges are caused by both the shortcomings in the theory behind investing for retirement and the lack of basic financial knowledge.

Visco (2008) rightly states that a commonly-accepted retirement goal for a healthy pension is for it to sustain the relatively higher standard-of-living of the latter part of one's working life throughout retirement (and that they do not outlive their assets). Individuals are being made to take greater responsibility for their own retirement and take haircuts in their post-retirement standard-of-living, as employer DB and government pension plans are either capped at levels well below a comfortable retirement or completely replaced by DC plans. Visco (2008) raises yet another challenge, "The current crisis has only highlighted the urgent need for better functioning markets and better retirement products, if future retirees are to be guaranteed adequate living standards… The phases of accumulation and decumulation are closely intertwined: the optimal design of the former strongly depends on the latter and vice-versa."

---

5 https://en.wikipedia.org/wiki/National_Pension_System#:~:text=The%20National%20Pension%20System%20(NPS,of%20the%20Government%20of%20India.

6 http://blogs.wsj.com/economics/2015/10/26/baby-boomers-hugely-underestimate-what-they-need-for-retirement/

A recent innovation implemented by Brazil in January 2023 might provide a solution to the pension challenges highlighted by Visco (2008) that apply to India. More importantly, the bond innovation satisfies the key goals identified by the Reserve Bank of India (RBI) in respect of the debt management, stable debt structure and Payments Vision 2025, as also the Aatmanirbhar goal of self-sufficiency desired by the government. Briefly, Brazil's RendA+ (or "Retirement Extra") bond, issued via a Treasury Direct facility and a digital platform, is an effective instrument that might serve as a model for India to adopt/adapt (Muralidhar and Vitorino 2023). This bond was designed along the lines of the "SeLFIES" ("Standard-of-Living-indexed, Forward-starting, Income-only Securities"), first proposed in Muralidhar (2015), Muralidhar, Ohashi and Shin (2016), and Muralidhar and Merton (2016). It is designed specifically to address the challenges of this new responsibility faced by informal and working and middle-class individuals worldwide, the majority of whom are totally unprepared to do so, and do not have access to sound financial advice.

The paper is structured as follows: Section I examines the current challenges in DC Retirement plans, highlighting how current "safe" instruments or "products" are risky from a DC retirement perspective, thereby paving the way to a future crisis unless changes are made immediately. Section II describes specific challenges faced in India. Section III describes *Inflation-linked, Deferred-Income, Annuity-like Securities (InDIAs)*, highlighting key features of the proposed new instrument for Indian government officials to consider and finalize. Section IV provides a case study of Brazil, focusing on a few design features that are critical to the successful issuance and trading of these instruments. Section V demonstrates how InDIAs can improve longevity risk hedging and demonstrate how InDIAs are attractive to the government. Section VI discusses the value of InDIAs in serving as a "currency for retirement". Section VII concludes.

I. The DC Retirement Challenge

The complexity of retirement planning leaves many confused about what constitutes adequate savings. Available information is overwhelming and lacks a robust, uniform method to calculate "replacement rates" (i.e., percent of salary replaced in retirement). Current DC reports inform

investors about accumulated wealth (and historical returns of various instruments), but provides no information on the likely guaranteed retirement income that the accumulated wealth would achieve. The recent passing of the SECURE 2.0 Act in the USA[7] will require reporting of potential retirement income, but the law does not specify a uniform method to do so, leading to extreme variability in how firms will report to individuals. Further, the Department of Labor (DoL) in the United States provides safe harbor guidance on appropriate investments (i.e., freedom from lawsuits for the employer if certain products are offered), but investing in existing assets remains risky relative to the retirement objective, given that these assets do not provide a simple, low-cost cash flow hedge against desired retirement income, as shown later. Similarly, in India, both NPS and second-pillar savers invest in the Employee Provident Fund Organization (EPFO), where returns are nearly guaranteed, but do not provide any retirement income guarantee. Even a portfolio of traditional, "safe" government securities, unless heavily financially engineered (at some cost), is risky because of the cash flow (and potential maturity) mismatch between traditional bonds and the desired retirement income stream. Finally, annuities could provide the desired retirement cash flow, but most investors worldwide do not buy annuities because they can be complex, illiquid, and opaque, and trigger the fear that these assets cannot be bequeathed to their heirs. In this section, we examine these drawbacks in more detail, paving the way for a new instrument that addresses the challenges posed by current T-Bills, Inflation Indexed National Savings Securities (IINSS) or Treasury Inflation Protected securities (TIPs), Target Date Funds (TDFs), gold, and annuities/guaranteed return products.

The Retirement Income Goal: What is the desired retirement income stream or cash flow of an individual? Assume that a 25-year-old in 2023 would typically plan to work for 40 years and would like to receive, say, ₹50,000 real/year for 20 years in retirement (assuming death is known; an assumption we relax later). They would welcome this real stream to be indexed to an appropriate nominal adjustment to allow them to retain their pre-retirement standard-of-living. Figure 1 plots the likely real retirement cash flow of this 25-year-old. Figure 1 shows that the goal requires no cash flows for 40 years (through 2063), followed by a steady stream of real income for 20 years. This is far different from a single wealth number that individuals are expected to stipulate as their "retirement number" or even a guaranteed return. It is therefore a critical point, as the traditional

[7] https://www.investopedia.com/secure-2-0-definition-5225115

approach to the retirement challenge in India has been entirely wealth-focused or return- focused; however, what Figure 1 clearly demonstrates is that retirement is completely about guaranteeing that individuals receive a target, steady level of real retirement income. This simple change in goal has far-reaching implications for what can be considered the safe asset. Merton (2007) had raised a cautionary flag about DC investment practice in the early 2000s that persists today – the excessive focus on wealth or size of assets (and rates of return on investments) in retirement accounts as opposed to the level of retirement income – the more appropriate measure of retirement welfare.

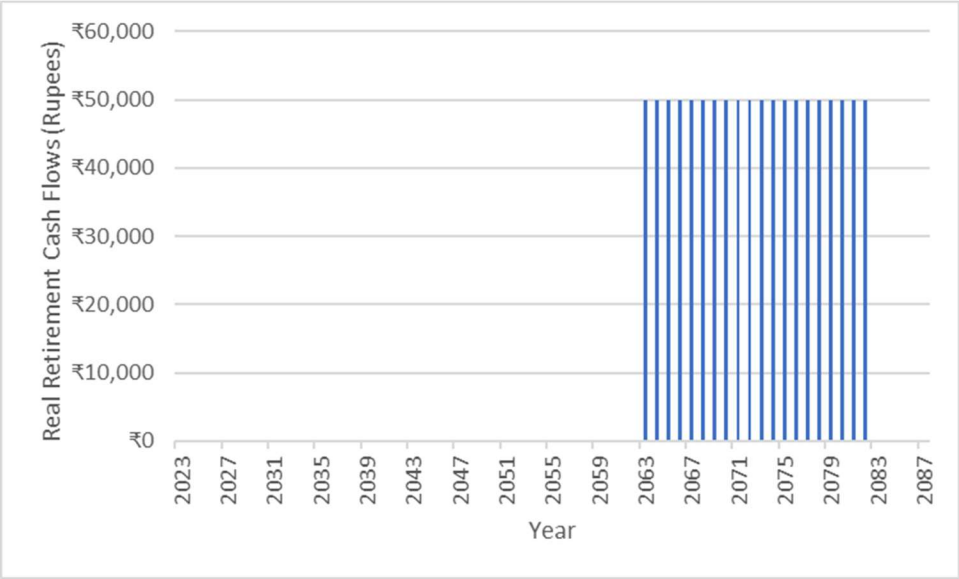


Figure 1: Projected Real Retirement Cash Flows of an Indian 25-year-old in 2023 – work 40 years; live for 20 years.

Challenges with T-Bills. Merton (2007) warns that the "risk-free" asset in MPT and most DC plans is quite risky in terms of annuity income units (Merton 2010, 2012, 2013, 2014a, 2014b). Annuity Income Units (AIU) measure the level of steady income that can be earned through an annuity at any given time, based on prevailing interest rates. Merton (2014a) argues that the goal of retirement investors should not be to maximize wealth, but rather to maximize funded status (i.e., assets divided by liabilities), as this effectively puts the spotlight back on retirement income being the goal of investment decisions. The reason for raising this point was to show how assets that are regarded as safe in the traditional MPT context – T-Bills (or money market instruments) – are actually risky from a DC retirement context (or when measured from the perspective of AIU).

While T-Bills preserve principal (assuming they are default-free), they provide no guarantee of retirement income due to both the cash flow mismatch to Figure 1and the fact that the focus (wealth preservation) is entirely different from what is needed in DC plans (steady retirement income). This is shown in the second panel in Figure 2 as the relative volatility of a T-bill (relative to the desired cash flow in Figure 1 or AIU) being clearly non-trivial and non-zero or low. Hence, "safe" assets in current DC plans globally are risky from a retirement income perspective, putting retirees at risk of poor retirement outcomes.

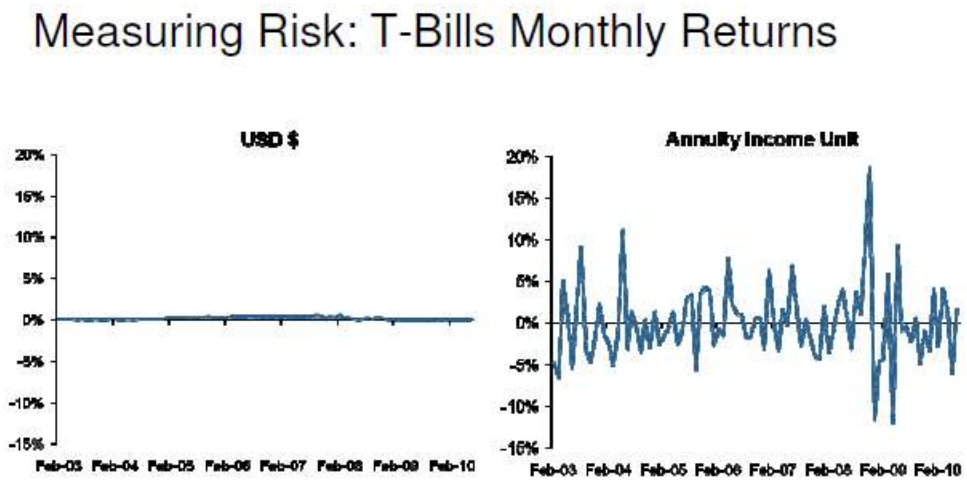


Figure 2: Measuring Risk of T-Bills from an Absolute and Annuity Income Unit Perspective (Source Merton: 2014)

Challenges with IINSS or TIPs \. It may be argued that T-Bills are not the safe asset in retirement but rather that investors should invest in IINSS or TIPs instead, given that they offer a longer maturity and protection against inflation, especially as TIPs are relatively short-term. However, this viewpoint is easily disproved on two critical grounds – they engender a cash flow mismatch and they offer the wrong nominal protection. Consider a simple 30-year IINSS or TIPS bond that pays a ₹3 real coupon/year and repays the real ₹100 principal at maturity. The real cash flows of this bond are plotted in Figure 3. This bond: (a) pays coupons when the individual does not need it – i.e., the payments are received pre-retirement (the retirement date denoted by the solid green line at 2063), thereby requiring additional transactions to transform these coupons into the cash flow stream required in Figure 1; (b) pays a stub principal in 2053, which is also not needed – the

cash flow stream required is the steady stream in Figure 1, and 2053 is short of the retirement date (2063); and (c) is linked to consumer price inflation, whereas the true risk in retirement is the standard-of-living risk. As ING (2019) notes, "About half of retirees in Europe tell us that they don't continue to enjoy the same standard of living they had when they were working." This issue of appropriate indexation of pensions to standard-of-living had been raised by Merton (1983), but, unfortunately, has been largely ignored and continues to be a challenge globally.

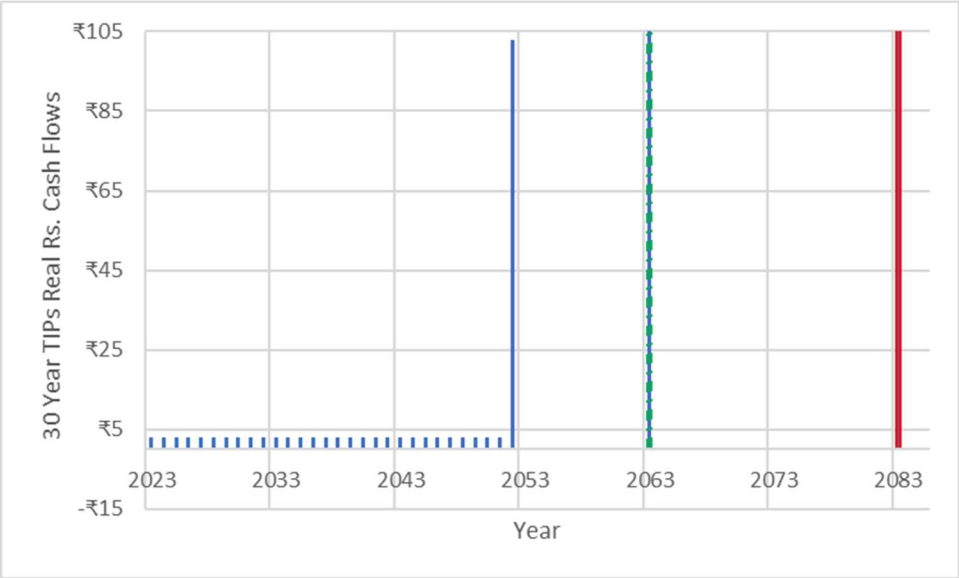


Figure 3: Cash Flows of 30 Year TIPs ₹ Cash Flows relative to retirement date (2063) and death (2083)

In simple words, converting the cash flows from the TIPS in Figure 3 to the desired cash flows in Figure 1 will require at least 61 additional, cost-inefficient transactions (two per year for each semi-annual coupon, and one for the principal payment, and that too of miniscule size for the average individual). Hence, IINSS or TIPS cannot be considered the safe asset for retirement.

The Challenges with TDFs. Moreover, Merton (2007) demonstrates that the investment approaches adopted by many DC funds and retail investors, especially TDFs, are actually inefficient and risky

from an individual retirement income perspective (see also Bodie et al 2010).[8] Muralidhar (2011) had raised a similar cautionary flag. Put simply, these products rotate the asset allocation from stocks (risky from a DC retirement perspective) to bonds (also risky, as shown in Figures 2 and 3) as one ages, with no focus on the retirement income target. As Kobor and Muralidhar (2018) demonstrate, a TDF provides a highly variable retirement income because the glide path is independent of the target retirement income (e.g., Figure 1), and the achievable target retirement income is continuously impacted by stock market performance and changes in interest rates, among other variables. Further, the glidepath is independent of the individual's personal situation (e.g., gender, current wealth, risk tolerance). As Merton (2014a) notes, investing an entire cohort (that was born in the same year) in the same TDF is like buying the average shoe size for a roomful of people – highly unlikely to be ideal for anyone, let alone everyone. Moreover, two individuals with identical saving/investing characteristics, retiring a few years apart, can achieve wildly different retirement incomes, as shown in Kobor and Muralidhar (2018). As a result, even though DoL in USA provides safe harbor protection for TDFs, they are risky instruments. Providing safe harbor protection to these products raises the likelihood that governments will have to bail out participants who receive low to poor pensions from their DC plans.

The Challenges with Annuities. Muralidhar (2019c) summarizes the challenges with annuities, which continue despite the fact that 37 years ago Prof. Franco Modigliani noted (in his 1986 Nobel speech) that annuities are under-utilized (termed the "annuity puzzle"). Ostensibly, annuities could provide the cash flow required in Figure 1 and could be the "safe" asset, but this is useless if individuals do not purchase them. Salisbury and Nenkov (2016) note, "In June 2015, U.S. retirement assets totaled $24.8 trillion, with only 8.6% of assets held as annuity reserves." This annuity puzzle has had many explanations, including adverse selection (i.e., only those who know they will live long want to buy annuities), bequest motive[9], complexity/inflexibility of contracts[10], mortality salience[11], etc. Beshears et al. (2012), using survey data, note that even when the annuity option is the default in DB schemes, people opt for the lump-sum option, given that while they

[8] Target Date Funds are portfolios of stocks and bonds, where the allocation to bonds increase as the investor ages. They are normally referred to by a retirement date (e.g., 2050), and have a starting allocation to stocks and bonds and then a glide path, which adjusts this allocation based on the calendar year.

[9] Lockwood (2012).

[10] Mitchell et al (2000).

[11] Salisbury and Nenkov (2016).

want a lifetime income, they also want flexibility in spending while worrying about the credit risk of the plan sponsor.

Indian annuity markets face challenges due to a wide range of factors. According to CFA (2020), Indian annuity rates are unattractive because of a "lack of robust mortality data, issues in the fixed income market, and other factors such as taxation and the cost of doing business." [12] For example, "In India, the most recent mortality rates published are based on the insurance population rather than one specifically built on annuitants. But the profiles of the two segments may be different. For example, the insurance pool is likely skewed towards the segment of the population that has more health issues, while the annuitant pool may be healthier than average. This may lead to underpricing of longevity risk for healthy annuitants to the detriment of annuity providers. The available data for annuitants is more than a decade old, and reflects the experience of one insurer, the Life Insurance Corporation of India, and isn't representative of the population in general."

The Challenges with Guaranteed Products: In India, EPFO had nearly 69 million active members[13] whose returns, though guaranteed,[14] do not provide any retirement income guarantee. While EPFO[15] does supervise the investments and set forth the rules governing the initial and periodical information provided to members and transparency on investments, sadly, guaranteeing a return or the principal does not guarantee a real retirement income, as depicted in Figure 1, because they have the same risk as T-bills (discussed above).

Despite the fact that many Indians consider gold a retirement asset, we have chosen to ignore gold in this discussion because it is trivial to show how gold is risky relative to the desired retirement income stream. In summary, existing instruments and products in India are risky, illiquid, costly, potentially complex, and clearly insufficient, and include too many intermediaries to address the

[12] CFA Institute. 2020. Overhaul needed. https://blogs.cfainstitute.org/marketintegrity/2020/04/27/overhaul-needed/

[13] Members contributed over the previous year ending May 2023. Source: https://mis.epfindia.gov.in/ChartDashboard/

[14] In practice, returns are "announced" every year and subject to change, although in practice they are within a tight range.

[15] Pension Fund Supervisory Board.

looming global retirement challenge, especially for a largely financially unsophisticated and uncovered population.

II. The Challenges Faced by India – Pensions and Debt Funding

Pension Challenges and Incentives

According to Mercer (2022)**,** "India's retirement income system comprises an earnings-related employee pension scheme, a DC employee provident fund (EPFO) and supplementary employer-managed pension schemes, which are largely DC in nature. Government schemes have been launched as part of the universal social security program aimed at benefiting the unorganized sector. The overall index value for the Indian system could be increased by introducing a minimum level of support for the poorest aged individuals, increasing coverage of pension arrangements for the unorganized working class, and introducing a minimum access age so it is clear that benefits are preserved for retirement purposes, and improving the regulatory requirements for the private pension system."

According to OECD (2021), "Indian workers are covered under the earnings-related employee pension scheme and defined contribution employee provident fund administered by the Employees Provident Fund Organization (EPFO) and other employer managed funds. Civil Employees of Central Government who have joined services on or after 1 January 2004 are covered under the Defined Contribution based New Pension System (NPS)." The NPS was later expanded to state government employees, corporates, and individuals. Lastly, the NPS also covers subscribers from the Atal Pension Yojana (APY), a government-administered structured pension scheme for the unorganized sector, which provides a monthly pension of up to Rs. 5,000 per month, depending on the contribution.

The EPF scheme is mandatory for all employees with a basic wage of less than Rs. 15,000 per month, with employee contribution of 12% and employer contribution of 3.67%. For employees with a basic wage more than Rs. 15,000, the employer contribution is a matching 12%, but the mandatory contribution is capped at Rs. 1,800 (12% of 15,000). The entire corpus would be withdrawn at retirement and there is no annuity component.[16] Under the NPS, employees

[16] There is an employee pensions scheme under EPFO, but the benefits for most subscribers are small compared to their final salary.

contribute 10% of their basic salary (14% for government employees) with a matching contribution by employers. At retirement, the employees have compulsorily to purchase annuity against at least 40% of their retirement corpus.

The number of workers enrolled in a formal pension system is low. As of May 2023, 69 million active members were in the EPFO,[17] although the total number of members is estimated to be at least three times higher.[18] As of March 2023, the number of subscribers in the national pension system was 63 million, with over 70% of them subscribers of APY.[19] The number of people employed is estimated to be around 500 million for a population of approximately 1.5 billion,[20] estimating the coverage of the working population across the second-tier schemes at 26%. This compares with an average coverage of 95% for mandatory pension schemes for OECD countries.[21] The coverage in voluntary private pensions is miniscule: estimated at 6% (Mercer 2022).

The switch from the OPS, which was guaranteed (at 50% of the last salary drawn) but not fully funded, to the NPS, which was funded, but not guaranteed, has not proved popular with government employees, as seen by protests across various states.[22] In response, at least five states – Rajasthan, Chhattisgarh, Jharkhand, Punjab, and Himachal Pradesh – reinstated the OPS.[23] Highlighting the risks, the RBI stated, "A major risk looming large on the sub-national fiscal horizon is the likely reversion to the old pension scheme by some States. The annual saving in fiscal resources that this move entails is short-lived. By postponing the current expenses to the future, States risk the accumulation of unfunded pension liabilities in the coming years."[24] The state of Andhra Pradesh has experimented with the NPS, combining DB and DC elements. In this

[17] Active members calculated as those members who made a contribution in the past 12 months. Source: https://mis.epfindia.gov.in/ChartDashboard/

[18] https://www.pfrda.org.in/myauth/admin/showimg.cshtml?ID=2170

[19] https://www.pfrda.org.in/index1.cshtml?lsid=2026

[20] Calculations by author. Estimated population of 143 million, multiplied by the worker-population ratio of 35%. Sources: Periodic labour force survey https://www.mospi.gov.in/sites/default/files/publication_reports/QuarterlyBulletinPLFS%20JanuaryMarch2023.pdf. UN Data https://www.un.org/en/desa/india-overtake-china-world-most-populous-country-april-2023-united-nations-projects

[21] https://www.oecd-ilibrary.org/sites/2c555ff8-en/1/3/1/6/index.html?itemId=/content/publication/2c555ff8-en&_csp_=618dc867ebfad4dd8ba60e3e2f8dcdf9&itemIGO=oecd&itemContentType=book

[22] https://www.thehindu.com/news/national/karnataka/massive-protest-by-workers-under-nps-scheme/article66282767.ece

[23] https://www.livemint.com/news/india/centre-says-5-states-to-restart-old-pension-scheme-11675725303256.html

[24] RBI. State Finances: Study of Budgets. https://rbi.org.in/Scripts/PublicationsView.aspx?id=21637

instance, employees contribute to the NPS as before, but if the annuity from their wealth corpus is below 30%, the state will guarantee the difference.[25]

Debt Funding

The RBI is responsible for debt management of the Central Government of India, its broad objectives being cost optimization, risk mitigation, and market development. In recent years, the RBI has focused on diversifying beyond banks and other financial institutions, targeting retail investors through the RBI Retail Direct Scheme. To this effect, it undertook several public awareness campaigns around the scheme and enhanced the platform to make it more user-friendly. The weighted average maturity of debt has increased over the years from 10.65 in 2016-17 to nearly 12 years in 2022-23.[26] The weighted average maturity of debt issued in 2022-23 was 16 years, as compared with 14.76 years in 2016-17.

Coverage and Literacy

Financial literacy in India is low. According to a survey conducted by the National Center for Financial Education, the overall financial literacy measured 27% in 2019.[27] The survey covered over 75,000 respondents sampled across geography, urban and rural regions, and socio-economic strata. Financial literacy was measured according to the OECD guidelines on financial literacy, which measures across three areas – namely, financial attitude, behaviour, and knowledge --, and a person is deemed as financially literate if they scored at least 15 out of a total score of 22 across the three areas.

III. The Innovative InDIAs Design – Inflation-indexed, Deferred Income, Annuity-like Securities

In light of the problems besetting the NPS, India is considering pension reforms. In March 2023, the Finance Ministry set up a committee under Finance Secretary, T.V. Somanathan, to review the pension system for government staff, "which addresses the needs of employees while maintaining

[25] Hindustan Times. In India, is guaranteed funded pension feasible? https://www.hindustantimes.com/opinion/pensions-in-india-old-vs-new-vs-guaranteed-and-the-need-for-inflation-protected-products-101680450282733.html

[26] RBI. Public debt management. 2023. https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/7PUBLICDEBTEDD5EC3A9DCC46D1AC523425062BA48D.PDF

[27] https://ncfe.org.in/images/pdfs/ExecSumm_.pdf

fiscal prudence".[28] The time is ripe to improve the system for all citizens, and not just government employees, a system that will be market-oriented, fiscally prudent, and provide robust retirement outcomes. A recent survey from Defined Contribution Institutional Investment Association's (DCIIA) Retirement Research Center (RRC)'s "Profiling Retiree Spending in 2022" sheds light on what (American) retirees seek. The survey was conducted on 2,009 retirees, aged 50-75, and the question most pertinent to our study is, "Pick the action of the three presented that are the most and least important when thinking about your finances in retirement." The results of the survey are presented in Figure 4 below, and it would not be unreasonable to expect, until further research is conducted, that Indian retirees are somewhat similar.

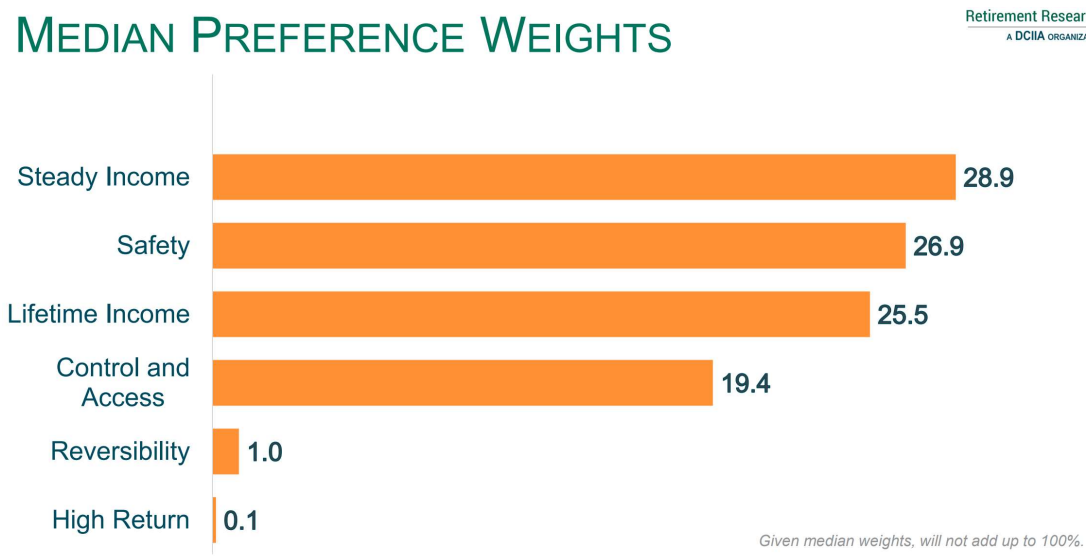


Figure 4: Figure 4: Median Preference Weights of American Retirees with regard to Most and Least Important Aspects of Retirement Finance (Source: DCIIA RRC 2022)

Muralidhar (2015) and Muralidhar, Ohashi and Shin (2016) identify a new instrument that they call Bonds for Financial Security (BFFS), with a real cash flow stream identical to the one shown in Figure4. SeLFIES go a step further by incorporating the innovation of Merton (1983) of hedging standard-of-living risk and issuance/innovation by governments to complete markets. Since the safe asset in DC plans (focused on target retirement income) does not exist, SeLFIES are designed

[28] https://indianexpress.com/article/business/old-vs-new-hotting-up-govt-forms-panel-to-relook-at-pension-8517629/

to mimic the pension payments in Figure 1. Treasury can create and issue this new, simple, low-cost, liquid, and "safe" ultra-long bond instrument, and they can be purchased directly by any individual (to create a type of "individual DB") or institution.

We recommend an easy, quick, and efficient solution for India to address all these challenges and improve retirement security by creating and issuing an innovative new bond – InDIAs, the Indian version of SeLFIES. InDIAs is a single, liquid, low-cost, relatively low-risk (government-issued) instrument, easy-to-understand for even the most financially unsophisticated individual, because it embeds accumulation, decumulation, compounding, and inflation-adjustments. These features make them consistent with the optimal design features highlighted by Visco (2008) and consistent with the objectives in Figure 4.

InDIAs starts paying investors upon retirement (i.e., forward-starting), and it pays real income-only (e.g., ₹5 real/year), ideally indexed to aggregate per capita consumption (to hedge standard-of-living risk[29]), for a time period equal to a period linked to the average life expectancy at retirement (e.g., 20 years). Figure 5 shows a simple cash flow chart of InDIAs that starts paying in 2063 for 20 years. The sharp negative bar in 2023 is the potential payment (an arbitrary price for this example) made today to acquire the desired retirement cash flow stream (i.e., the price of InDIAs). InDIAs is a purely market-based instrument with the market forces at the time of issuance determining its issue price and secondary market price. Most importantly, instead of the current bonds that index solely to inflation, the **ideal** InDIAs covers both the risk of inflation and standard-of-living improvements by indexing to per-capita consumption to ensure that retirees preserve their standard of living (e.g., by tying payments to a GST-linked Index). This is critical, especially given that retirement planning is potentially a 60-year process and the standard-of-living risk today is a key unmanaged risk globally.

[29] For example, with a linkage to Goods and Services Tax (GST) for additional reasons explained later in Section IV.

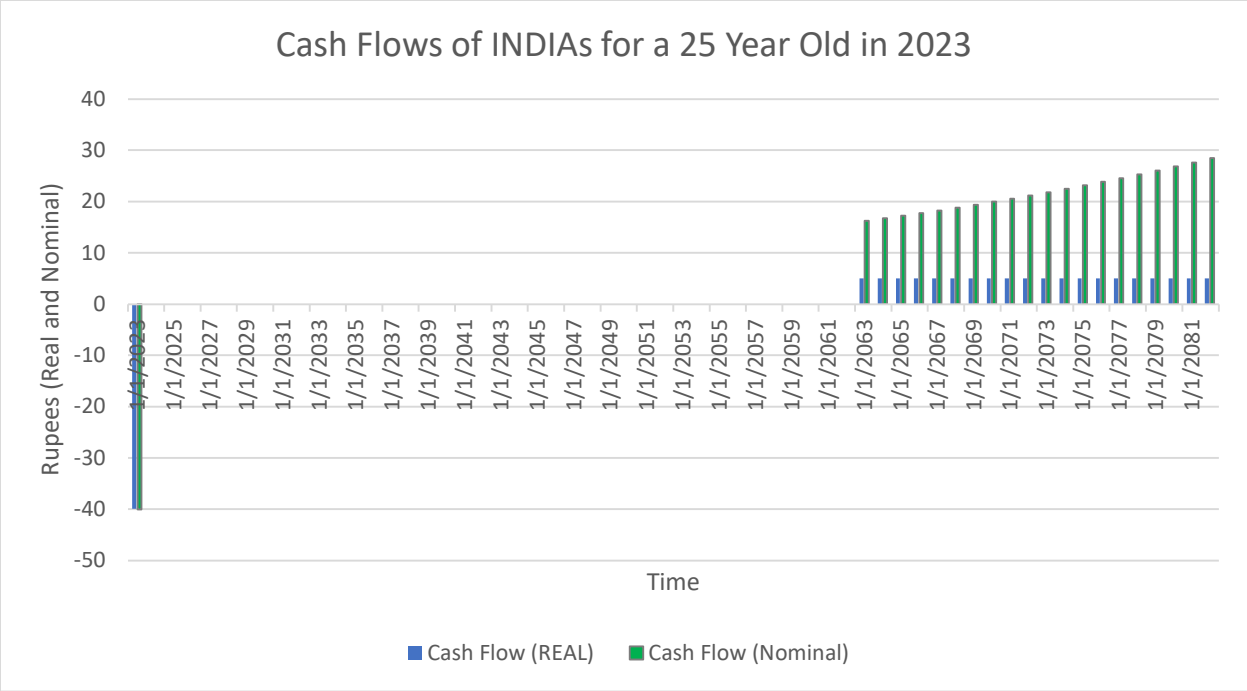


Figure 5: Real Cash Flows of 2063 INDIAs: Pay ₹5 real from retirement date (2063) for 20 years (2083). Source: Authors' Calculations – assumes Inflation of 2% p.a. for illustrative purposes.

InDIAs is designed to pay people *when* they need it and *how* they need it, and greatly simplify retirement investing. A 55-year-old in 2023 would buy the 2033 bond, which would start paying coupons at age 65, and keep paying for, say, 20 years, through 2053. InDIAs caters to all individuals independent of retirement date. For example, if our 25-year-old in 2023 wants to guarantee ₹50,000 annually, risk-free for 20 years in retirement, as in Figure 1, to maintain their current standard of living, they would need to buy 10,000 InDIAs (₹50,000 divided by ₹5) over their working life; and the real and nominal cash flows of a single 2063 InDIAs are shown in Figure 5. Periodic DC plan statements can easily inform individuals as to how much retirement income they can expect to receive, based on current holdings of InDIAs (and conversion of other assets into InDIAs-equivalents), relative to the target (10,000), thereby allowing easy course corrections prior to retirement. More importantly, as noted in Visco (2008), at the end of the Great Financial Crisis, these locked-in real income payments are unaffected by changes in the economy, interest rates, and stock markets. In addition, InDIAs can be bequeathed to heirs (who can then either continue to collect the coupons or sell the InDIAs in the secondary market). If InDIAs is well-designed, it has the potential to ensure longevity risk protection.

Almost a decade ago, India had issued a security, the Inflation Indexed National Saving Securities - Cumulative (IINSS-C), which has similar features to InDIAs.[30] The IINSS bond offers investors a return that is 1.5% more than inflation, based on the consumer-price-index. Interest is compounded half-yearly. Only retail investors, through authorized banks can invest in these securities, cumulative investment being capped at ₹1 million per annum. Investors can make premature redemption at a penalty, and the securities are transferable to nominees at death. InDIAs will differ from IINSS in that the payouts are deferred, priced by the market using an auction process, with the principal being amortized throughout the retirement period of 20 years from the cash flow start date, instead of a bullet payment. Moreover, a more eclectic version could be linked to a GST-based index.

Visco (2008) further comments, "DC plans require workers to make a number of difficult choices, such as whether or not to enroll, how much money to contribute, how to invest it and when to rebalance the portfolio." InDIAs requires only the most basic information and offers choices for buyers of any educational strata, thereby addressing the financial literacy challenges noted by Alessio et al (2020). The two required inputs are the anticipated date of retirement (i.e., the InDIAs payment start date) and the target income goal for a comfortable retirement, which determines the number of InDIAs needed to reach this goal. Since InDIAs' payments are indexed to per capita consumption, they protect against future inflation and standard-of-living uncertainties. The buyer must simply set their goal at the current level of their daily life, a number already familiar to them in their everyday decisions. The three (current) complex decisions of saving, investing, and decumulation (and forecasting inflation) are simply folded into an easy calculation of how many bonds to buy. In the case of Brazil, this result is displayed on the Treasury website and the app designed for this purpose. If they change their retirement date, they could easily sell/buy the relevant InDIAs with little effort and minimal cost. Even the most financially illiterate individual can be more self-reliant in respect of retirement planning. Since InDIAs does not make payments until the retirement date, the buyer does not need to make any further transactions or decisions to reinvest coupon or principal payments during the entire accumulation period. One transaction, one time, for each InDIAs purchased minimizes costs, decision effort, and errors. In a way, one can see InDIAs as a "simplified term annuity in a bond". Interestingly, if these instruments are held

[30] https://www.rbi.org.in/commonperson/English/Scripts/FAQs.aspx?Id=1293

in JanDhan accounts that were created to improve financial inclusion among those who are not served by the traditional financial services industry, one can easily see how this instrument improves financial inclusion.

To be accurate, InDIAs cannot address the issue of insufficient savings that has afflicted many pension systems globally, including India. If people do not buy enough InDIAs, they will not have their dream retirement, as InDIAs on its own can do nothing directly to change saving rates. What it can do is provide a better understanding/knowledge to people on how they are doing in terms of saving for retirement [i.e., the funded ratio], given that people, in general, understand income comparisons better than wealth-to-income comparisons. However, merely knowing they do not have enough for retirement will not ensure that they will alter their behavior to save more. Further, saving without taking any risk with it makes it extremely hard for people to get to a good retirement, as the amount to be saved is staggering in comparison to traditional saving practices. Finally, as InDIAs makes clear, simply saving enough to buy income instruments assures success in getting one's targeted retirement income; whereas savings that go into Indian Treasury long-term bonds does not ensure the aspired retirement, because if they are nominal bonds, they have inflation risk, and if they are IINSS or TIPS, one is faced with standard-of-living growth risk. In sum, if people do not save enough, no financial instrument is going to offer them a good retirement.

InDIAs bonds have the potential to hedge some of the liabilities for insurance companies that write annuity contracts or pension funds that create guaranteed products. If priced correctly, individuals who purchase the bond at the retail level and hold it until maturity could convert the bond principal repayment into an annuity, as shown in Section IV.

IV. Case Study of Brazil and Design Features and Impact on Improving Market for Retirement in India

Muralidhar and Vitorino (2023) provide a case study of Brazil's pension challenges, analyzing why issuing RendA+ bonds provide an instrument that was missing in financial markets. The key features of these promising bonds are now highlighted in recommending high-level design features for India.

Issuance and Trading. The key issue to note is that InDIAs **will not be subsidized**, but will be a pure market-based instrument; traded and issued like any other government bond in any country. Many countries like the United States, Japan, India and even Brazil also have "Treasury Direct" facilities, which allow individuals to purchase government debt directly from the Treasury or Central Bank and thereby reduce transactions costs. India already has an RBI Retail Direct Scheme, with plans afoot to raise awareness of the scheme as well as develop a mobile application for improving the ease of access for retail investors.[31] If the purchase and custody could be completely digitalized, then it will allow India to benefit from the JanDhan accounts and expand financial inclusion through this innovation.

Institutional InDIAs should be issued through the traditional auction process and traded in the aftermarket. The primary participants in these auction and secondary markets are large institutions such as insurance companies, pension funds, and asset managers, and this current market-based process ensures effective price discovery. These purchases can create innovative retirement income protected securities (RIPS) as opposed to prevailing capital market guarantee products, which are inefficient from a retirement perspective. Thereafter, the market-based prices can be used as the basis for Retail Direct, which is a low-cost channel for individuals who seek to purchase these instruments in fractional shares. This transparent price discovery process ensures that the prices at which InDIAs is sold to individuals directly are not subsidized or have to be rationed. Governments aiming to help marginalized groups in society better their retirement income can choose to match purchases (or even allow individuals to purchase such assets on behalf of, say, maids, informal workers, etc.) Adopting current bond issuance processes for InDIAs ensures efficiency. Further, the concept of offering a bonus for buy-and-hold investors who purchase these securities is probably worth continuing, as that is market practice.

Brazil started with only a retail version of RendA+, but issued a detailed note on how the instrument would be priced prior to the launch to ensure market acceptance. It then took extensive efforts to educate the market on the benefits of RendA+. The instrument is issued through Tesoro Direto, and can be sold back to the National Treasury with very tight spreads. To encourage long-

[31] RBI. Public debt management. 2023. https://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/7PUBLICDEBTEDD5EC3A9DCC46D1AC523425062BA48D.PDF

term holding and not speculative trading, limits have been set on the minimum holding period, and the custody and tax treatments are linked to the holding period, incentivizing holding until retirement age, much like Italy.

In addition, Brazil issued bonds with start dates of 2030, 2035, 2040, 2045, 2050, 2055, 2060, and 2065 to ensure that the entire demographic spectrum of young to pre-retirement individuals is covered. Muralidhar and Vitorino (2008) show that over 36,000 individuals had purchased RendA+ within two months, and it was most popular with the 40-59 age group, and the purchases made by the young were non-trivial. Further, investments totaling US$100 million were made in this set of instruments, including 8,500 new purchasers of government securities, thereby facilitating financial inclusion. This could be key to the reversal of the low coverage challenge in India.

Level of Real Coupon and Indexation Choices. Merton and Muralidhar (2017a) argue that each country will need to decide on the appropriate level of real coupon that works for their target market. For example, Merton and Muralidhar (2017a and 2017b) prescribe an annual $5 real coupon for the United States; Merton, Muralidhar and Ferreira (2019) suggest an annual €5 real coupon for Portugal (and the EU); whereas Merton, Muralidhar and Vitorino (2020) suggested a BRL 0.04/month for Brazil, assessing that the average income and the target population for Brazilian SeLFIES would require such a coupon. Instead, Brazil chose a more traditional issuance, with a 6.48% real coupon, indexed to the IPCA index, which was already a well-established index, and the payments will be made monthly (on the 15th of each month) to synchronize with Social Security payments.

Similarly, the appropriate index for nominal adjustments might differ by country as well. In Uruguay, the law requires that pensions be tied to growth in real wages; hence, if SeLFIES were issued, it may make sense to issue bonds indexed to wages for legal reasons, even though it may not provide ideal protection against standard-of-living adjustments.[32] India may consider InDIAs

[32] The Ministry of Finance in Uruguay has recently issued wage-index securities with staggered principal repayment – a sort of variation on SeLFIES – to help local insurance companies hedge their annuity offering to individuals and try to complete the market and encourage private provision of annuities.

linked to the traditional consumer price inflation index as a first step to creating the ideal instrument (because inflation indexation does not hedge changes in the standard of living).

Most importantly, Brazil allows for the purchase of RendA+ in fractional shares of as low as $5 (₹400). India could choose a lower fractional share. As noted earlier, the mode of issuance through a simple website/app makes it possible to offer "SeLFIES on cellphones", thereby allowing uncovered workers and low-income workers to secure a safe pension. This even allows young people to start to save with small savings in a secure and liquid manner.

Longevity Risk Management. For InDIAs to provide the same pattern of payments as a pension, it must address the lifetime payment feature and protect against longevity risk as well (Merton and Muralidhar 2019). Working- and middle-class citizens who reach retirement age [e.g., age 65] are a diverse group: some have economic responsibilities for several people and need to bequeath money to take care of their heirs. Others have no one else for whom they are responsible and, hence, have no motive to bequeath assets. For the latter, the annuity or a life pension is ideal because they maximize the benefit payment with no risk of running out, and leave no "wasted" assets when they no longer need money. When the person reaches retirement, they have the best information as to their health [i.e., personal life expectancy vs the population], they will know who they are responsible for besides themselves, and what other assets and commitments they have. With this information, they are best positioned to make an informed decision on how much to annuitize or not, and thereby implement a personalized plan for de-accumulation.

InDIAs does not directly provide an embedded annuity feature of payments for life, but it does contribute to longevity risk protection for those who do eventually select full or partial annuitization at retirement, while providing decision flexibility to those who do not want to annuitize. The ideal design calls for the number of years of payout to equal a period somewhat longer than the life expectancy for the cohort population at retirement. For example, if life expectancy at age 65 is 20 years [age 85], then the specified-payment period on the InDIAs might be set at 22 years [age 87]. A well-run insurance company should be willing to exchange a life annuity with the SAME ₹5 indexed real payment for the specified term of ₹5 real payments on the InDIAs. If so, then the retiree can simply exchange their InDIAs for a life annuity with no extra

payment and no reduction of retirement income level. Those retirees in different circumstances can adjust accordingly, and potentially enjoy the built-in de-accumulation payments in InDIAs with no further transactions.

Why would a well-diversified insurance company be willing to exchange one InDIAs for a life annuity that pays ₹5 real/year till death (ignoring profit and cost considerations)? If the insurance company has insured a large group of diverse individuals in one cohort, then its net longevity realization should be close to the economy average of that cohort, with relatively low risk. InDIAs delivered in the exchange is the perfect hedging instrument for the insurance company's aggregate liabilities of this cohort. The somewhat longer payments on the InDIAs than expected [22 vs 20 years] provide compensation to the insurance company for cost and profit. It becomes more interesting if the insurance company is also diversified across multiple cohorts. Hence, InDIAs with a maturity a touch above the economy average could facilitate a much more efficient annuity market to ensure individual longevity risk mitigation. Both insurance companies and pension funds would be natural institutional buyers of large denomination InDIAs and create price discovery through their auction.

Using InDIAs to Create Better Investment Products. Currently, the NPS, which provides auto- and active- choice target allocations to investors, does not offer individuals any guarantee of target retirement wealth or income, as shown in Section 1. Individuals who participate in these programs would, in all probability reach retirement with extremely inadequate, retirement income (especially when annuity rates offered by insurance companies are lower than government-sponsored senior citizen schemes). InDIAs greatly enhances innovation by creating better guaranteed retirement income products or what are referred to as Target Income Funds (TIFs). Those seeking no risk, low-cost income instruments can invest all their savings in InDIAs. For more risk-taking retirement funding strategies, which cater to individuals who cannot/do not save enough or have a higher risk tolerance, a well-run asset management company can use a dynamic allocation strategy between risky assets and InDIAs, with InDIAs as the "risk-free" asset that locks in guaranteed retirement income – a highly desirable result (see Levitan and Merton 2015; Kobor and Muralidhar 2019).

V. InDIAs – A Good Deal for the Indian Government

SeLFIES have been proposed (in chronological order) for regions/countries as diverse as Europe (Merton and Muralidhar 2016), US (Merton and Muralidhar 2017a and 2017b), France (Merton, Muralidhar and Martelleni 2017), India (Merton and Muralidhar 2018a), Australia ((Merton and Muralidhar 2018b), Japan (Merton and Muralidhar 2018c), Turkey (Merton and Muralidhar 2018d), Colombia (Garcia 2018), Korea (Merton 2018), Spain (Merton, Muralidhar, and Herce 2018), Portugal (Merton, Muralidhar and Pinto Ferreira 2019), and Brazil (Merton, Muralidhar and Vitorino 2020), among others. InDIAs is a good deal for the Indian government, as it hits on the objectives of the Public Debt Management and the Payment Vision 2025 (financial stability, inclusion, innovation, and digitalization), as outlined by the RBI, and encourages more retail ownership of government debt while also addressing coverage and financial literacy concerns. InDIAs not only improves retirement outcomes for all citizens saving for retirement, but also has spill-over benefits.

India issued the IINSS bonds targeted to retail investors, with denominations as low as ₹5,000; Brazil allowed individuals to purchase RendA+ in slices as small at $5 (notice that the price and denomination are different, allowing a 25-year-old Indian to probably buy a bond with ₹1,000 denomination that pays ₹5 real for 20 years to cost in the neighborhood of ₹40-50 at today's rates); InDIAs is a simple extension of IINSS with a higher goal of improving retirement security. InDIAs also satisfies the goal of increasing retail ownership of government bonds and improves the country's self-reliance.

InDIAs not only improves retirement outcomes for all citizens saving for retirement, but also has spill-over benefits, and funds infrastructure, which is a major challenge globally (as the cash flows of InDIAs are synergistic with these long-term investments). The average life of Indian debt is 12 years; INDIAs extends this maturity dramatically, and potentially improves balance sheet management (as governments with goods and services taxes have a hedge against future payments). Issuing InDIAs will also allow for the development of better pension products by innovative asset managers, insurance companies, banks and pension funds, given that they would invest in such bonds, allowing them to hedge their liabilities from the annuities or life income instruments that they issued. InDIAs as the safe asset also allows for robust risk-based regulation

(Muralidhar 2018a), thereby enabling the government not only to help complete financial markets, but also improve overall sovereign debt management operations (through better hedging of revenues and bond payments, and potentially extending duration) and lower the risk of retirement security.

InDIAs can also be issued by entities other than the Central Government. For example, large state governments provide pensions for uncovered workers, such as fisherman, single women, and workers involved in traditional professions, and InDIAs provides an alternative to PAYG systems to ensure these promises are funded and priced by markets. There are other alternatives, albeit lower credit, private issuers, but the overriding benefit of government issuance of InDIAs is that it mitigates credit risk.

VI. InDIAs – A Currency for Retirement

One of the challenges in preparing for retirement and anticipating likely pension outcomes is that individuals lack a "currency for retirement"; namely, a simple way to gauge the impact of changes in current economic policy on future retirement outcomes. A clear indication of the unintended consequences of loose monetary policy in the 2000-2020 period has been the secular decline in the funded status of DB pension funds (Cuomo and Wigglesworth 2019).

Examining the Impact of Economic Policies. Merton and Muralidhar (2015) show that central banks lowered rates in response to the GFC in the widely-believed hope that these actions would stimulate consumption and investment through the "wealth effect". However, lowering interest rates led to big declines in the funded status of pensions (as liability values rose more than asset values). This decline in "relative wealth" caused a number of distortions not anticipated in traditional theory, especially in an aging population. Employers (both government and corporate) were forced to contribute to their pension funds while older citizens and retirees struggled, muting the impact on consumption, investment, and government spending (which might have been a more effective tool had these resources not been diverted to support pensions). Even the 2018 US tax reform resulted in an unintended outcome in this liability-centric world – corporations had greater incentive to contribute to their pension funds instead of paying dividends or investing in new capital, thereby resulting in fiscal policy potentially having limited impact on future growth.

However, had InDIAs/SeLFIES existed, analysts would have been able to see the immediate impact on retirement security. For example, in 2019, the US Federal Reserve decided to embark on a policy of lowering rates again – which had an immediate impact on long-term rates. If InDIAs had existed, the immediate impact would have likely been a dramatic increase in the price of InDIAs (these being long duration instruments), immediately alerting individuals that planning for retirement just became a lot more expensive and would require additional saving relative to levels previously projected prior to rates being cut. This role as a "currency for retirement" could prove invaluable at examining the impact of a range of policy choices on retirement security well in advance of individuals reaching retirement and discovering that their savings are likely to lead to a paltry retirement income (which is a challenge faced by Latin American countries). In addition, in countries with negative long-term interest rates, this realization might compel a different choice of policies that does not necessarily trade off retirement security for current growth.

Alternative Sources of Funding Retirement. One of the challenges with inadequate savings is that it will lead to poor retirement outcomes. As a result, other assets owned by individuals will need to be considered to bolster the retirement pot – with one asset in particular, one's house, holding potentially the greatest promise. The current instrument to convert one's home into retirement income, the reverse mortgage (RM), has not enjoyed sufficient success to make this a game changer. While a number of changes have been proposed to improve the RM contract (Merton 2015; Muralidhar 2018b), InDIAs, at a minimum, will allow individuals to clearly understand how much potential retirement income (and protection of pre-retirement standard-of-living) their current assets are likely to generate. This is an additional benefit to having a "currency for retirement".

VII. Summary

The prevalent looming retirement crisis where individuals are increasingly being asked to take responsibility for their own retirement planning, is daunting because a majority of these individuals are financially unsophisticated. They cannot perform basic compounding calculations and do not understand the impact of inflation, both critical aspects of retirement planning. Yet, these individuals are being tasked with the responsibility for three complex, interconnected decisions: how much to save, how to invest (with many additional decisions), and how to decumulate one's portfolio at retirement. While the National Pensions system comprises a mandatory annuitization

of at least 40% of the retirement corpus, poor annuity rates make this an unappealing option. The coverage of people in the formal pension systems is low, and current decumulation products are inadequate.

Compounding these challenges, current investment approaches and products (e.g., target date funds or even gold) are risky because they focus on the wrong goal – namely, wealth at retirement, instead of how much retirement income can be guaranteed to support pre-retirement standard-of-living. Moreover, annuities are complex, costly, and illiquid and seldom used. Without financial innovation and a change in the metric for measuring retirement success, many individuals will retire poor – a financially and socially undesirable outcome for any country. This paper presents an easy, quick, and efficient solution to address all these challenges and improve retirement security by creating and issuing an innovative new bond – InDIAs. The InDIAs bond is a single, liquid, low-cost, low-risk, easy-to-understand instrument for even the most financially unsophisticated individual, because it embeds accumulation, decumulation, compounding, and inflation-adjustments.

InDIAs is good for the Indian government too, as the bond lowers the risk of individuals retiring poor, improves balance sheet management, and funds infrastructure/green investment, while also increasing the share of retail investors in the holders of government debt and leveraging existing financial infrastructure (JanDhan accounts). The paper also discusses key design aspects of InDIAs to show how they can ensure longevity risk protection and protection against declines in the standard of living, a key unmanaged risk globally today. Moreover, they can serve as a "currency for retirement".

InDIAs is a win-win for all - it can greatly improve retirement funding security for citizens, provide a better cash-flow match, and fund infrastructure for the government. The time to act is NOW - the longer the delay, the higher the cost of ensuring retirement security for future generations and increasing the burden and cost to government and Indian citizens.

Acknowledgements: Thanks to Prof. Robert C. Merton, Sivananth Ramachandran, Amit Dev Mehta, Dr. Amlan Roy, Partha Mukhopadhyay and Dr. Ramasastry Ambarish for helpful discussions on how SeLFIES might apply to India. We also thank Sanjay Muralidhar for highlighting the challenge of forecasting inflation in retirement planning. And to other collaborators in other countries, especially Alexandre Vitorino, for sharing their experiences with us: Finally, thanks to exceptional editing and modifications by Jeanette Fernandes for taking a technically complex document and transforming it into a readable text. Thank you. All errors are mine.

References

Beshears, J., J. Choi, D. Laibson, B. Madrian, and S. Zeldes, 2012, "What makes annuitization more appealing?" *unpublished working paper*

Bodie, Z., R. Fullmer, and J. Treussard, 2010, "Unsafe at any speed? The designed-in risks of target-date glide paths," *Journal of Financial Planning* March, 42-48

Cumbo, J., and R. Wigglesworth, 2019, "'Their house is on fire': the pension crisis sweeping the world," *Financial Times*, November 17, https://on.ft.com/2TFAf9Y

Davidson, K., 2015, "Baby boomers hugely underestimate what they need for retirement," Wall Street Journal, October 26, https://on.wsj.com/39mbF4x

GAO, 2015, "Federal action could help state efforts to expand private sector coverage," GAO-15-556, General Account Office, September 10, https://bit.ly/39yjYu8

Garcia., D. M., 2018, 'Selfies' de jubilación para mayor cobertura," *Portafolio.co*, August 1, https://bit.ly/3asS1UC

ING, 2019, "Survey savings - saving woes stretch retirement outlook," February, https://bit.ly/2Ih2Ay7

Indian Ministry of Economy and Finance (MeF), 2023. *Public Debt Management Guidelines,* Department of the Treasury. https://www.dt.mef.gov.it/export/sites/sitodt/modules/documenti_en/debito_pubblico/presentazioni_studi_relazioni/Guidelines-for-public-debt-management-2023.pdf

Klapper, L., A. Lusardi, and P. van Oudheusden, 2015, "Financial literacy around the world: insights from the Standard & Poor's ratings services global financial literacy survey," World Bank Development Research Group, November 2015

Kóbor, A., and A. Muralidhar, 2018, "How a new bond can improve retirement security" *Retirement Management Journal* 7:1, 16–30

Kóbor, A., and A. Muralidhar, 2019, "Ensuring retirement security with simple GLIDeS," https://bit.ly/39mSckj

Levitan, S. M., and R. C. Merton, 2015, "Defined-contribution retirement fund investment strategies: an appropriate default?" *Presented at the Actuarial Society of South Africa's 2015 Convention,* November 17–18, https://bit.ly/2TATTnx

Lockwood, L. M., 2012, "Bequest motives and the annuity puzzle," *Review of Economic Dynamics* 15, 226–243

Mercer (2022), Mercer CFA Institute Global Pension Index [Online] Available at: https://www.mercer.com/our-thinking/global-pension-index-2021.html

Merton, R. C., 1983, "On consumption indexed public plans," in Bodie, Z., and J. Shoven (eds.), *Financial aspects of the United States pension system,* National Bureau of Economic Research

Merton, R. C., 2007. "The future of retirement planning," in Bodie, Z., D. McLeavey, and L. B. Siegel (eds.), *The future of life-cycle saving & investing*, CFA Institute

Merton, R. C., 2010, "Next generation retirement planning," *Pensions & Investments*, West Coast defined contribution conference, October 24–26

Merton, R. C., 2012, "Observations on financial education and consumer financial protection," Bodie, Z., L. B. Siegel, and L. Stanton (eds.), *Life-cycle investing: financial education and consumer protection*, Research Foundation of the CFA Institute 2012: 3 (November)

Merton, R. C., 2013, "Applying life-cycle economics: an income-oriented DC retirement solution that integrates accumulation and payout phases," U.K. Nest conference on retirement, June,

Merton, R. C., 2014a, "Funding retirement: next generation design," JASSA *Finsia Journal of Applied Finance* 4, 6-11

Merton, R. C., 2014b, "The crisis in retirement planning," *Harvard Business Review*, July-August, https://bit.ly/2IgxQgN

Merton, R. C., 2015, "Addressing the global challenge of funding retirement. The reverse mortgage: core issues of design structure, marketing, funding and valuation," Presentation at B I Norwegian Business School, October 9, https://bit.ly/38lmYZx

Merton, R. C., 2018, "SeLFIES - a globally applicable bond innovation to improve retirement funding and lower government financing cost," Presentation at the World Knowledge Forum – Seoul, Korea, October 18, https://bit.ly/2vtPQSe

Merton, R. C., and A. Muralidhar, 2015, "Monetary policy: it is all relative," *Pensions and Investments,* April 16, https://bit.ly/3cvKDtK

Merton, R. C., and A. Muralidhar, 2016, "Time for retirement 'SeLFIES'?" *Investments and Pensions*, April 27, https://bit.ly/3angbjB

Merton, R. C., and A. Muralidhar, 2017a, "An effective DC plan for uncovered workers: the flex MMM plan," *Plan Sponsor Magazine*, February 8

Merton, R. C., and A. Muralidhar, 2017b, "SeLFIES can improve the nation's retirement security," *Plan Sponsor Magazine*, November 20

Merton, R. C., and A. Muralidhar, 2018a, "SeLFIES for India: these long-term bonds can fund India's infrastructure needs and improve retirement security," *The Times of India*, February 5, https://bit.ly/3auQPjT

Merton, R. C., and A. Muralidhar, 2018b, "SeLFIES a good look for retirement. Top 1000 funds," June 8, https://bit.ly/3anUmjO

Merton, R. C., and A. Muralidhar, 2018c, "SeLFIES can improve Japan's retirement security," *Nikkei*, June 22, https://bit.ly/2wrz8CW

Merton, R. C., and A. Muralidhar, 2018d, "Emeklilik İçin Basit ve Etkin Bir Çözüm Önerisi: SeLFIES" (a simple and efficient solution for retirement SeLFIES)," *BEST Magazine*, June, https://bit.ly/3apEHQZ

Merton, R. C., and A. Muralidhar, 2019, "Taking a closer look at SeLFIES: added thoughts clarifications," *Pensions and Investments*. May 27, https://bit.ly/2TFDFtk

Merton, R. C., A. Muralidhar, and A. Herce, 2018, "Bonos para mejorar las pensiones," *El Pais*, December 14, https://bit.ly/3aruKCy

Merton, R.C., A. Muralidhar, L. Martellini, 2017, "Pour la création "d'obligations retraite," Le Monde, April 4, https://bit.ly/38pU6iJ

Merton, R. C., A. Muralidhar, and R. Pinto-Ferreira, 2019, "SeLFIES for Portugal: an innovative pan European retirement solution," in Cabral, N. C., and N. C. Rodrigues (eds.), *The future of pension plans in the EU internal market,* SpringerLink

Merton, R. C., A. Muralidhar, and A. Vitorino, 2020, "SeLFIES can help Brazil create a SUPER supplementary pension," *Unpublished Working Paper*

Mitchell, O. S., J. M. Poterba, and M. J. Warshawsky, 2000, "New evidence on the money's worth of individual annuities," *National Bureau of Economic Research*. no. w6002

Modigliani. F., 1986, "Life cycle, individual thrift and the wealth of nations," *Economic Sciences (based on Lecture on receiving Nobel Prize in Economics)*, 150-170

Modigliani, F., and M. L. Ceprini. 1998. Social Security Reform: A Proposal for Italy. Review of Economic Conditions in Italy. Ed. Bank of Rome, No. 2.

Modigliani, F., and A. Muralidhar, 2004, *Rethinking pension reform*, Cambridge University Press

Muralidhar, A., 2011, *A SMART approach to portfolio management*, Royal Fern Publishing, LLL

Muralidhar, A., 2015, "New bond would offer a better way to secure DC plans," *Pensions & Investments*, December 14, https://bit.ly/2VDZLzc

Muralidhar, A., 2018a, "Fifty states of gray: an innovative solution to the DC retirement crisis," *Investments and Wealth Institute*

Muralidhar, A., 2018b, "Retire in-home: a new way to use a home to guarantee retirement income," December 1, https://bit.ly/39n6jGu

Muralidhar, A., 2019a, "Can (financial) ignorance be bliss?" *Financial Analysts Journal* 75:1, 8 - 15

Muralidhar, A., 2019b, "The F-utility of wealth: it's all relative," *Journal of Investment Management* 17:2, 1–11

Muralidhar, A., 2019c, "Managing longevity risk – the case for longevity-indexed variable expiration (LIVE) bonds," *Retirement Management Journal* 8:2019, https://bit.ly/32MaBoe

Muralidhar, A., K. Ohashi, and S. Shin, 2016, "The most basic missing instrument in financial markets: the case for forward-starting bonds," *Journal of Investment Consulting* 16:2, 34-47

Muralidhar, Arun, How Brazil's RendA Bond Could Render DC Retirement Risk Obsolete: A Case Study (March 15, 2023). Available at SSRN: https://ssrn.com/abstract=

OECD (2021), *Pensions at a Glance 2021: Country Profiles, India*, OECD Publishing, Paris, https://www.oecd.org/els/public-pensions/PAG2021-country-profile-India.pdf.

Reserve Bank of India. 2023. Payment Vision 2025. https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/PAYMENTSVISION2025844D11300C884DC4ACB8E56B7348F4D4.PDF

Salisbury, L., and G. Nenkov. 2016, "Solving the annuity puzzle: the role of mortality salience in retirement savings decumulation decisions," *Journal of Consumer Psychology*, 26:3, 417–425

Visco, I. 2008. Retirement saving and the payout phase – how to get there and how to get the most out of it. *Keynote speech to the roundtable on "The impact of the payout phase on financial markets" at the OECD conference "The payout phase of pensions, annuities and financial markets"*, Paris, 12 November 2008.