SeLFIES:
A Globally-Applicable Bond Innovation to Improve Retirement Security, Infrastructure Funding, and Government Borrowing Cost

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The simulation assumes certain transaction costs with respect to trades made, whereas the live portfolio might incur different transaction costs.

The simulation assumes implementation of the allocation shifts by buying and selling the underlying indices, whereas live portfolios may use other instruments (i.e. futures, forwards, active or passive managers) with a different return or cost.

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My Background: All Sides of the Fence
Issued Bonds, Managed Pension Assets, Worked on Pension Reform, Founded an Asset Manager+Technology Firm

*World Bank*: Issued Bonds (early 1990s); Manager, Pension & Investments Depts (late 1990s)


*GWU*: Adjunct Professor of Finance

Author: *Innovations in Pension Fund Management* (2001)

*Rethinking Pension Reform*, with late Prof. F. Modigliani, Nobel Laureate (2004)

*SMART Approach to Portfolio Management* (2011)

Agenda: Addressing Two Major Challenges with a Simple Innovation

- Retirement security is a major challenge globally
- Most adults are financially illiterate
- Funding infrastructure is also a challenge
- Innovation can address these challenges
- Implications for public finance/regulation/markets

Requires governments and development banks to be creative

Global Pension Challenges
All Pillars Shaky

PAYGO DB Systems - Not Sustainable

Employer DB Systems - No Longer Offered

Employer or Central DC Systems - Many Challenges

Financial Illiteracy, Increasing Longevity, and Low Coverage and Savings plague all countries

Retirement Risk being Transferred to Individuals; Need Reform/Innovation

DC Pension Plans: Multiple Challenges
Going to Lead to a Global Retirement Crisis

- **Risk** transferred to individuals (one lifetime)
- **Three big/complex decisions to make:**
  - How much to save?
  - How best to decumulate? What annuity to buy?
- **Big time-gap** between savings and retirement
- **Financial illiteracy** of most participants
- **Have to deal with multiple parties = High cost**

Results in High Cost, Complex, Risky, Illiquid Options ("Annuity Puzzle")
DC Pensions: Most Adults Financially Illiterate
Most Individuals Cannot Answer Three Basic Finance Questions

- WB study* on literacy – dire cautions
- Individuals do not understand 3 concepts:
  - How compounding works
  - Impact of inflation
  - How diversification works
- Latin America/Asia – reasonably low financial literacy (25% - 45%)

How do we ensure safe retirement with this challenge?

What Constitutes a Good Retirement?

- Guaranteed income
- In real terms
- Preserves pre-retirement standard-of-living
- Ideally till death

Annuity Puzzle – Despite Attractive Aspects, Low Usage

Source:
DC Goal: Guaranteed, Real, Target Retirement Income Till Death

*Retirement Income Stream: Need Steady Real Cash Flow*

- **Work for 40 Years (25-65)**
- **Retired for 20 Years**
- **Maintain pre-retirement lifestyle**
- **Need steady real cash flow**
- **Till death, ideally (longevity risk)**
- **Goal: Looks more like a bond than a stock**

*Problem: No Asset Has This Profile/Bridges The Time Gap; Annuities Not Popular*
The Challenge: Finance Theory
Modern Portfolio Theory Focused on the Wrong Goal (Wealth)

- T-Bills or even regular bonds considered “safe”
- Protect principal (wealth)
- Volatile: Annuity/income perspective
- Current assets, retirement products (including Life-cycle Funds) are very risky
- During Privatization (1990s-2000s), govts forced high allocation to bonds to protect principal

Revised Perspective Has Interesting Implications for Macro Theory As Well

The Challenge: Bad Instruments
Even Inflation-Linked Bonds are Risky in Retirement Plans

- Cash Flow Mismatches/Reinvestment Risk
- Max US TIPS maturity = 30 years
- Slightly longer in countries like South Africa

- Inflation adjustment embedded in principal
  - Can only hedge 10 years pre-retirement
  - Do not need coupons when working
  - Do not need Principal repayment
  - Financial engineering to create annuity profile = risky, costly, illiquid, complex

More pertinent risk is Standard-of-Living risk
Solution: New Retirement Bond
SeLFIES Idea with Nobel Laureate Robert Merton

- Government/supras issue new bonds
- Key features of each bond:
  - Starts paying at age 65
  - Pays coupons-only for 20 years (life expectancy)
  - Pays real $5/year
- Goal = $50,000 per year/$5 per year = 10,000 bonds
- Establish demand for safe retirement asset
- Original idea with Professors from Japan, Korea: BFFS - Bonds for Financial Security
- Merton version: SeLFIES - Standard-of-Living indexed Forward-starting Income-only Securities

Solution: A Number of Key Innovations
The Importance of Standard-of-Living Adjustments

- Cash Flows of Bond match Cash Flows of Goal
  - No bullet repayment, just a steady Cash Flow
- Payments based on real amounts, not coupon (%)
  - E.g., $5 real/year or $5,000 pesos/year
- Nominal link relates to index connected to goal
  - Standard-of-Living risk is real for retirees
- Forward-starting – no cash flows when not needed
- Designed for financially unsophisticated population
  - Embeds inflation and compounding
- Could also be issued by insurance companies
  - Will need government to start process

Uruguay: Issued Wage-Indexed Bonds
Targeted to Pension Funds/Insurers – Pensions Linked to Wages

**Uruguay**
- Wage-Indexed ("Pension Units")
- Principal Repayment Amortized
- Typical Coupon Structure (%)
- Immediate Payment

**SeLFIES**
- Standard-of-Living Indexed
- Coupon-only Structure
- Coupon in Nominal Terms
- Forward-starting

*Other Features Identical (e.g., Semi-Annual Payment; Regular Issuance, Auction Process)*
Value of Indexation to Standard-of-Living
Comparing Different Options vs SeLFIES for Colombia

- **Colombia SeLFIES** would have generated 15.51% p.a. (01/03 – 06/18)
- **Beat IGBC/Colcap** = 13.98% p.a., **S&P 500** = 9.51% p.a.
- **2003**: Long-term real interest rate above 7%
- **2018**: Would generate lower yield (real interest rates close to 4%)
- **Key**: It is a safe asset. Provides protection from Inflation and Standard-of-Living

*Source: Data is from January 2003 – 2018. Prof. Mantilla’s presentation on SeLFIES*
### Average Compound Growth Rates: Korea

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Consumption per Capita</th>
<th>1-Year T-Bills</th>
<th>Stock Market KOSPI</th>
<th>Growth Short-Fall KOSPI / (CPI &amp; SoL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007-2017</td>
<td>3.7%</td>
<td>3.3%</td>
<td>3.0%</td>
<td>0.93 10 Years [0.96 T-Bill]</td>
</tr>
<tr>
<td>2000-2017</td>
<td>4.8%</td>
<td>4.0%</td>
<td>7.0%</td>
<td>1.42 17 Years [0.88 T-Bill]</td>
</tr>
<tr>
<td>1997-2017</td>
<td>5.0%</td>
<td>----</td>
<td>6.5%</td>
<td>1.33 20 years</td>
</tr>
<tr>
<td>1987-2017</td>
<td>8.4%</td>
<td>----</td>
<td>5.9%</td>
<td>0.50 30 years</td>
</tr>
<tr>
<td>1980-2017</td>
<td>9.1%</td>
<td>----</td>
<td>8.6%</td>
<td>0.84 37 years</td>
</tr>
</tbody>
</table>

Source: Statistics Korea, Bank of Korea Economic Statistics System

Source: Prof. Merton Presentation at Knowledge Forum, Seoul, Korea, Sept 2018 “SeLFIES: A Globally Applicable Bond Innovation to Improve Retirement Funding and Lower Government Funding Costs”
Demand for BFFS/SeLFIES: Retail, Institutional
Broad Group of Investors, Regular Purchases

✓ **Individuals**
  - uncovered by any public/private pension plan, ensures retirement through personal saving
  - covered by pension plan but low benefits, must accumulate additional assets through personal saving
  - covered by pension plan but part of the plan requires personal decision-making in which to invest the plan asset

✓ **Pension Funds and Insurance Companies** (pension, annuity benefit liabilities) want effective, low-cost hedge

✓ **Institutional and Retail Investors** who would want efficient, low-cost core “best-diversified” portfolio

‘Selfies’ de jubilación para mayor cobertura
Se trata de un modelo sencillo que no requiere de intermediarios.

Will Selfies stick?
Pension bonds are an ingenious idea for providing retirement income

But everyone still needs to save more

Source: The Economist, May 2018
BFFS/SeLFIES: Good for Governments+Supras

Unique Cash Flow Profile Synergistic with Infrastructure Investing

- Reduces risk of retirement poverty/bailouts
- Helps finance infrastructure projects
  - Key goal of many governments
  - Cash flows from bond = Infrastructure needs
- VAT regime = government is hedged
- Boosts national demand for debt; sustained demand
- Provides near-term budget relief (DANGER)
- Insurance companies – lower annuity costs
- Could be transformational in typically under-developed emerging markets (I issued the first Greek drachma bond by a development bank)
Additional Considerations

- **Does not address Longevity Risk**
  - Covers poor/low income individuals
  - Longevity Indexed Variable Expiration (LIVE) Bonds

- **Does it effectively measure Standard-of-Living?**
  - Per-capita consumption
  - VAT receipts adjusted for tax rate and population
  - Wage-indexed Securities (WISE)

- **How much demand for SeLFIES? How to Price SeLFIES?**
  - Demand: Large DC markets: Australia; Latin America; US
  - How to price these bonds? Demand and supply....

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Source: Nikkei, June 2018


Implications for Regulation

❖ Who?
  ✓ Independent agency with authority (Netherlands)

❖ What: The Goal?
  ✓ Focus on adequacy of retirement income (not wealth)
  ✓ Can measure through funded status or level of retirement income

❖ What: Role of Intermediaries?
  ✓ Ensure intermediaries acting in the interests of individuals

❖ How: Reporting?
  ✓ Reporting should be simple: report guaranteed retirement income
  ✓ Should also provide suggestions on achieving objectives (savings; risk)

Solution: SeLFIES Can Greatly Improve Regulation

Muralidhar, Arun. 2018. 50 States of Gray: An Innovative Solution to the DC Retirement Crisis, Investments and Wealth Institute, Denver, CO
Summary: SeLFIES Achieve Multiple Goals

- **Current DC trend necessitates need to innovate**
  - SeLFIES = Forward-starting IO-only Real Bond
  - Lowers cost, risk, complexity, and illiquidity

- **Good for Governments/Development Banks**
  - Lowers bailout likelihood; funds infrastructure; creates new investor segment

- **Good for Individuals**
  - Secures and simplifies retirement planning
Thank You!
Comparing Retirement Outcomes – Benefit of Locking-In
Comparing a 60 Stock/40 Bond, Life-Cycle Portfolio and SeLFIES

- Simple experiment: Invest $100,000 for 10 yrs (Use historical data)
  - 60% in Stocks (S&P500 Index)/40% in Bonds (Barclays Agg Index)
  - TDF: Start with 90% Equity; Sell Equity, Buy Bonds every Year
  - Buy BFFS/SeLFIES Every Month
- After 10 years, purchase annuity at retirement
- Buy 20-year income stream
- Other approaches highly volatile; SeLFIES “safe”
- This period: historic secular decline in rates

Open-Questions: Future Research

- No pressing need to innovate? Steady state debt structure?
  - GDP-linkers did not work; TIPS liquidity not great
  - Neither bond has a natural goal it hedges

- Debt levels could be high – data quality questions
  - Will they replace existing debt with SeLFIES?
  - Japan just revised historical wage data....

- Danger that MoFs/Treasury want to issue too much
  - Allows them to postpone debt service to a future government
  - May need IMF to monitor

- Creates a potential default pecking-order