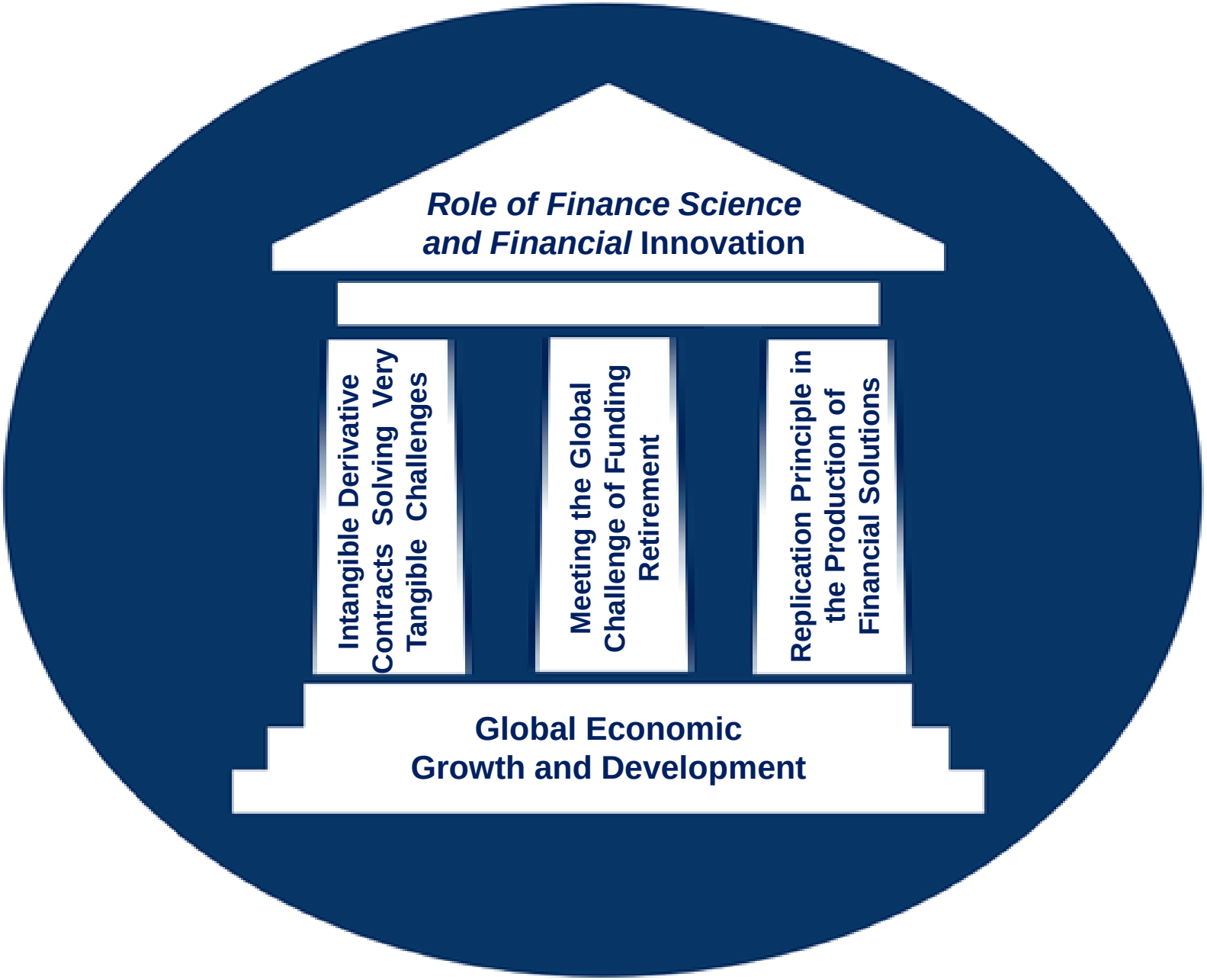
Observations on *the Role of Finance Science and Financial Innovation in Global Economic Growth and Development*

Robert C. Merton

S. Donald Sussman Fellowship Award Lecture

Massachusetts Institute of Technology

October 2, 2017



Observations on *the Role of Finance Science and Financial Innovation in Global Economic Growth and Development*

S. Donald Sussman Fellowship Award Lecture Part 1.

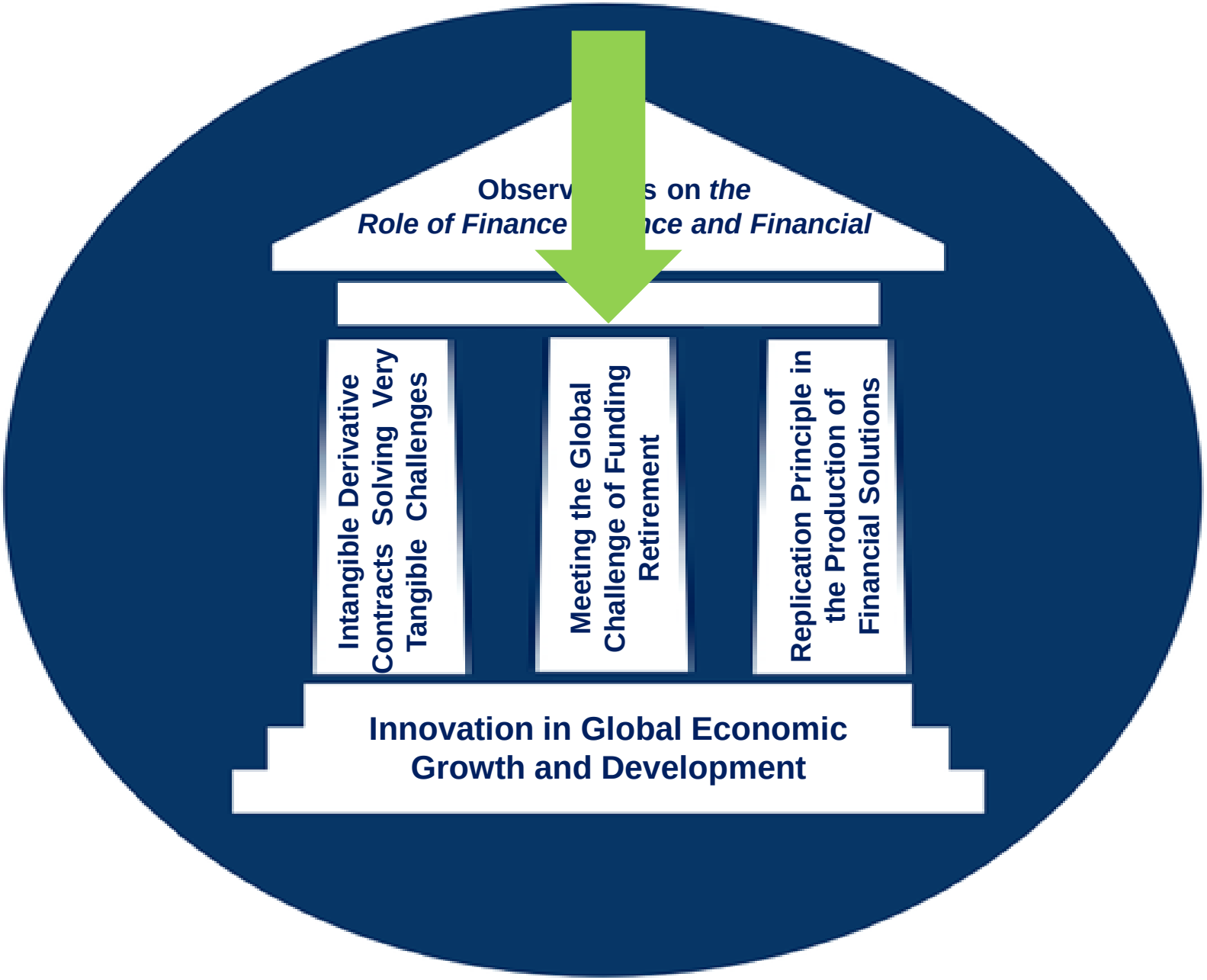
Intangible Derivative Contracts *from Wall Street* Can Solve Very Tangible Challenges to Economic Growth and Development *on Main Street:*
Examples from a Financial Economist's Notebook

S. Donald Sussman Fellowship Award Lecture Part 2.

Meeting the Global Challenge of Funding Retirement:
A Case Study of Financial Innovation in the Design and Implementation of a Solution

S. Donald Sussman Fellowship Award Lecture Part 3.

On the Dynamic Portfolio Replication Principle in the Production of Financial Solutions:
A Potpourri of Private- and Public-Sector Applications to Financial Innovation in the Future



Part 2

Meeting the Global Challenge of Funding Retirement:

A Case Study of Financial Innovation in the Design and Implementation of a Solution

Agenda of my remarks

- Global challenges to funding retirement
- Objective of a solution: What is a good retirement?
- Key design principles essential for a good solution
- How does this solution differ from current DC plan practice?
- There are only three ways to increase assets to increase the chances of achieving a good retirement
- Instruments to substantially increase the chances of achieving a good retirement without increasing assets— annuity and reverse mortgage
- Challenges to current reverse mortgage design structure
- Improving the reverse mortgage design and means of funding it
- Solution for the spend-down strategies in retirement phase

"The Crisis in Retirement Planning",*Harvard Business Review* July-August 2014
http://robertcmerton.com/

Global Challenges of Funding Retirement

Why current retirement funding systems may not be sustainable

Sources of potential non-sustainability of current retirement funding systems

- Shifting demographics: populations aging rapidly
- Increasing longevity: population living longer
- Economy shift from rural agriculture toward city industrial
- Legacy of large unfunded liabilities of define-benefit and pay-as-you-go pension plans from inadequate contributions and overly optimistic return-earning
- Contribution and balance sheet risks too great for plan sponsors causes the subsequent exit from defined-benefit plans *("DB")*
- Traditional role of defined-contribution plans (*"DC")* was supplemental and not for core retirement funding, and so current practice is not a suitable solution for core retirement

What is a Good Retirement Goal?

"An inflation-protected income for life that allows you to sustain the standard of living you enjoyed in the latter part of your working life."

Standard of Living is measured by income, and not by wealth

How Can We Achieve That?
Key Design Principles for a DC Solution

1. Set replacement income as the goal for retirement
2. Offer robust, scalable, low-cost investment strategies
3. Determine strategy taking into account all dedicated-to-retirement assets
4. Measure shortfall risk by income volatility -- not wealth volatility
5. Customize goals based on salary, age, gender, plan accumulation and other retirement-dedicated assets

How Can We Achieve That?
Key Design Principles for a DC Solution (continued)

6. Dynamically adjust portfolio allocations and goals in response to changes in both market and individual personal conditions

7. Be effective even for those who are completely unengaged

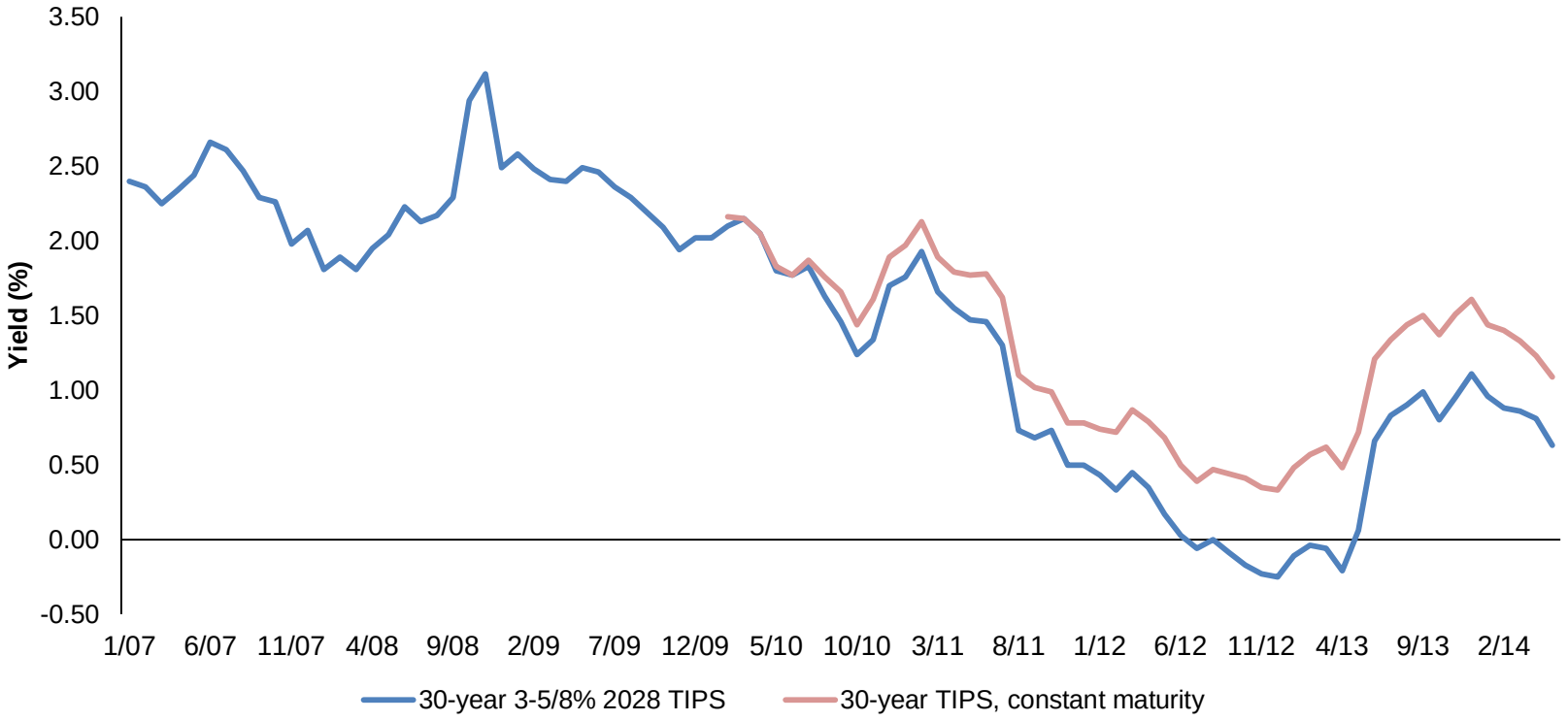
8. For the engaged, provide only meaningful information and meaningful, easy-to-make choices

9. Offer a seamless transition from accumulation to payout phase

10. Offer a wide array of payout flexibility, including immediate and deferred annuities to accommodate the varied circumstances of retirees and to manage longevity risk

Inflation-Linked Bonds (2007–2014)

30-Year TIPS Bond Yield



For illustrative purposes only.

Retirement Income vs Wealth Accumulation Risk

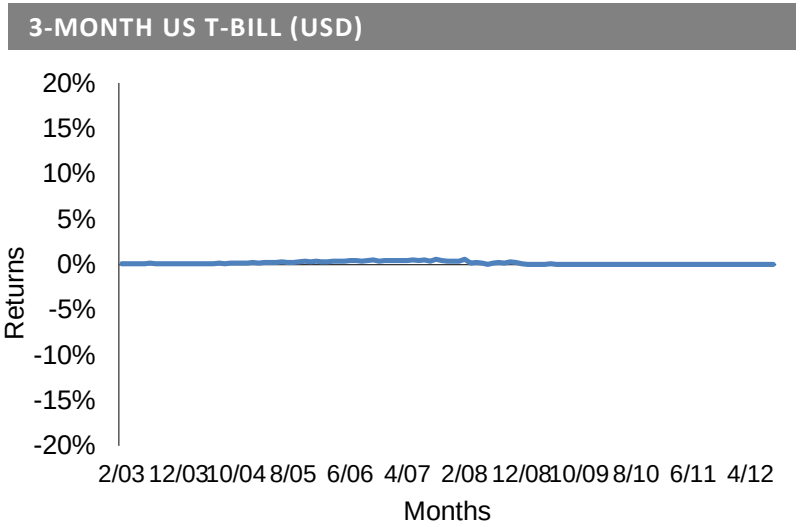
Age now	Decline in Retirement Income for the Same Accumulated Amount From 0% Interest Rate Versus a 3% Interest Rate
65	-26%
60	-31%
55	-41%
50	-49%

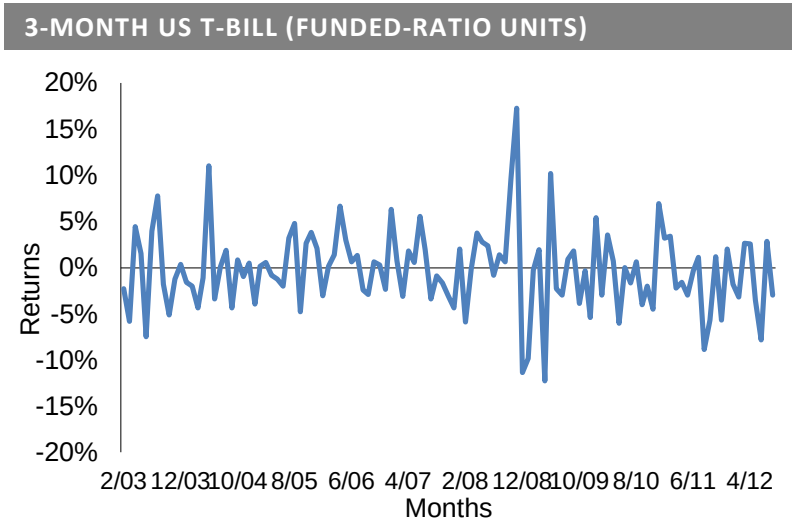
- Large impact from interest rate changes
- US TIPS rates fell from 3% to 0% (2007-14)
- This raises the cost of life income benefit
- As cost rises, the funded ratio falls
- There is substantial risk of retiree benefits change even if the value of the accumulation in the account is unchanged

Wealth Risk vs Income Risk

The volatility of T-bills is minimum risk measured in terms of change in asset value

But it is high risk measured in terms of change in income (funded-ratio) units

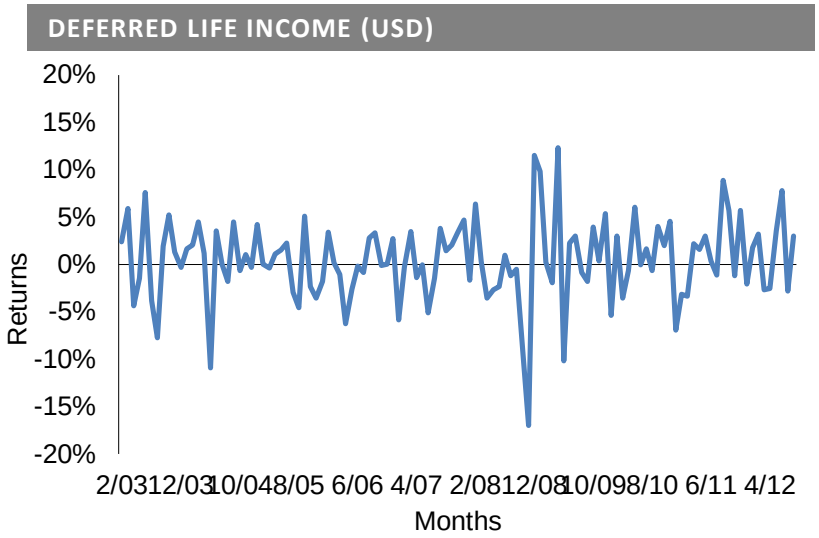




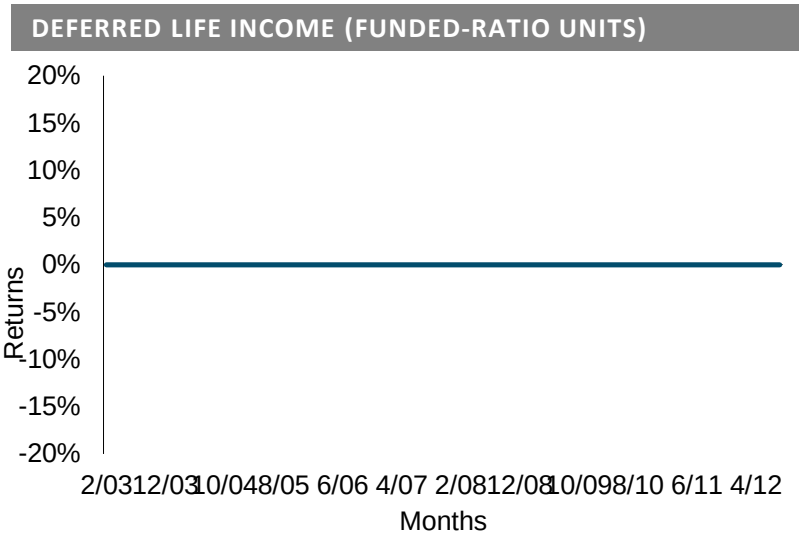
Based on T-bill data provided by Bloomberg.

Income Goal Needs Different Risk Measure

The volatility of life-income price is high risk when measured in terms of change in asset value.



The volatility of life-income price is minimum risk when measured in terms of change in income

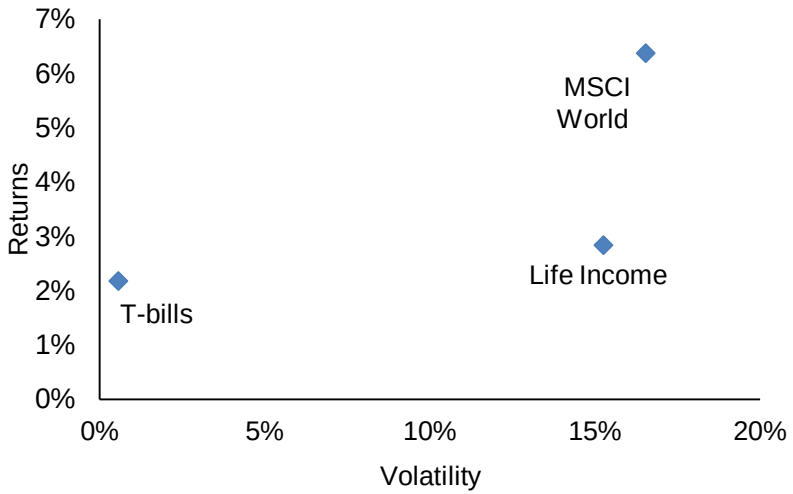


Annuity returns based on yield from US Treasury Inflation Protected Securities (TIPS). Data provided by Bloomberg.

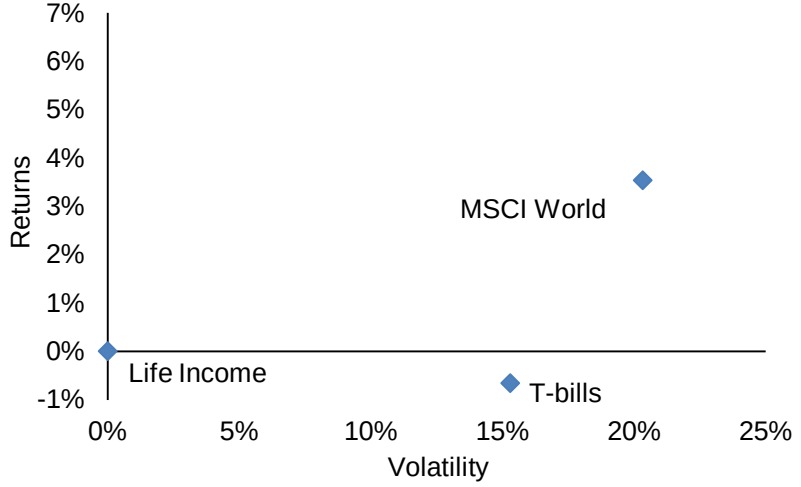
Risk & Return: Wealth vs Income Goal

Measuring the risk/return trade-off correctly

US DOLLARS



FUNDED-RATIO INCOME UNITS



Integrating All Funding Sources is Essential for Assessing Funded Status and Determining Optimal DC Allocation During the Accumulation Phase

Create a balance sheet for each plan participant that integrates all retirement-dedicated funding sources of retirement income and do so without engaging the participant in order to acquire any of the information for this creation.

Retirement Assets	Retirement Liabilities
Government Pension—Social Security	Minimum-Income Goal
Occupational Defined-Benefit Pension Plan	Surplus Available for Desired-Income Goal
Defined-Contribution Plan Balance	
Projected Future Contributions to DC ("Human Capital")	
Reverse Mortgage Potential	
Retirement Health Insurance Coverage	

How does this Solution Differ Vs. Current DC Practice?

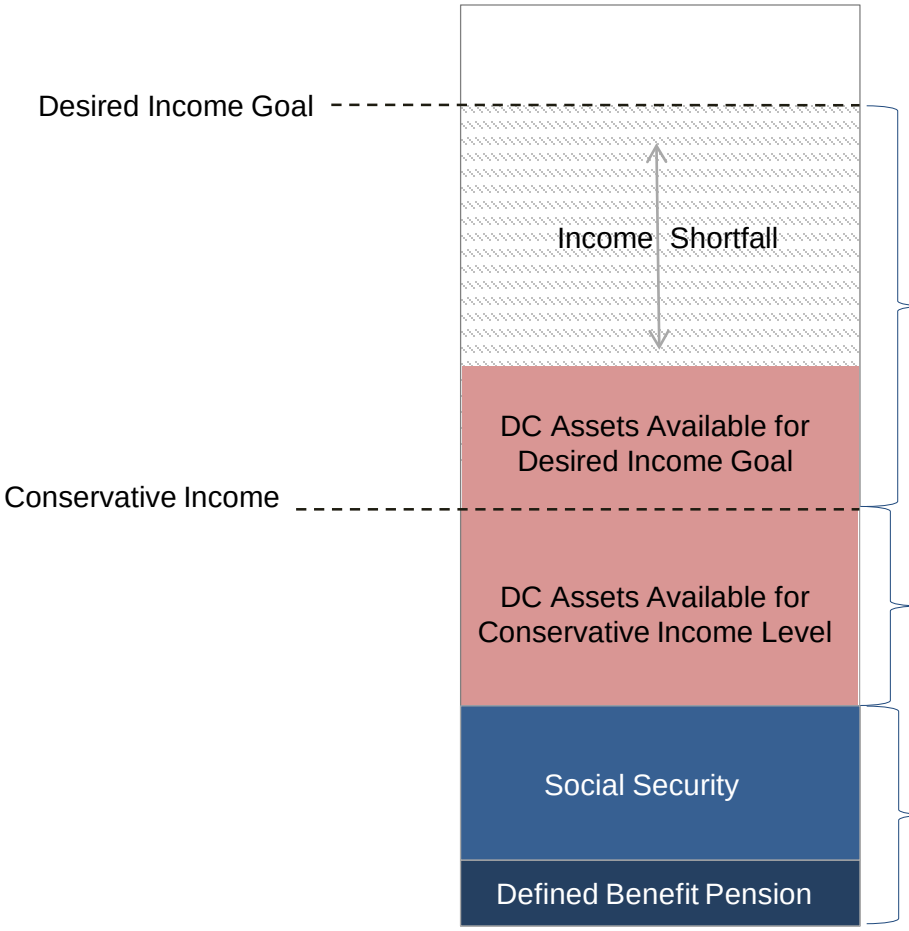
	Conventional DC Practice	New DC Solution
Investment goal	Wealth accumulation *No specified wealth goal*	Retirement income *Specified desired-income goal*
Risk measure	Volatility of portfolio returns	Volatility of Income (funded ratio) *Income shortfall*
Success measure	Account balance size	Closeness to goal --funded ratio *Relative to desired-income goal*
Asset allocation strategy	Generic proportions *Fixed or age-only based* *Target Date Funds*	Dynamic integrated individualized *Based on age, income, funded ratio.* *Focused on improving funded ratio while managing income volatility*

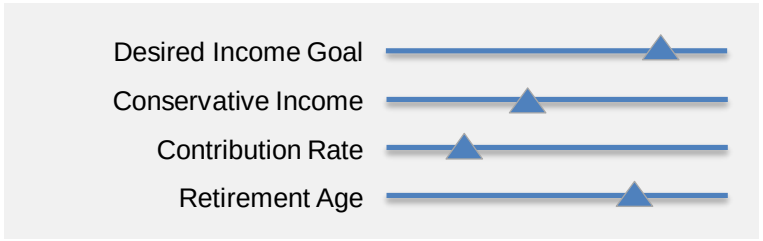
Only 3 Ways to Increase Assets to Increase the Chances of Achieving a Good Retirement

- Save more for retirement → lower lifetime consumption level
- Work longer before retiring → accumulate longer and shorten retirement period
- Take more investment risk → face the consequences if that risk is realized

Improving expected returns for the same risk is always desirable as is lowering costs for the same service or choice options but these have long been actively pursued.

Simplification from Only Meaningful Information and Meaningful, Easy-to-Make Choices, with Feedback





LEVEL 3 – Seek to maximize the estimated probability of achieving the desire income goal.

- Portion of savings allocated to a combination of equity and fixed income
- Reduce equity exposure target is estimated to be achieved

LEVEL 2 – Aim to achieve at least the conservative income level

A lower "baseline" income achievable at a higher estimated probability

- Portion of savings allocated to fixed income

LEVEL 1 – Guaranteed retirement benefits

- Included in retirement income goals

How to Increase the Chances of Achieving a Good Retirement without Increasing Assets

Increase retirement income benefits without changing individual saving behavior, retirement age or risk

- **Annuities** pay a guaranteed income benefit for as long as the retiree lives and thus, eliminates retirees' pervasive fear of outliving their assets. The payout on the annuity is substantially larger than the interest that could be earned on the assets, in return for giving up the assets at death when they are no longer needed. An annuity and a pension are functionally the same.

How to Increase the Chances of Achieving a Good Retirement without Increasing Assets: The House

The house is typically the family's most valuable asset at retirement and is the only material personal saving by either working or middle-class retirees.

The owner-retiree's house asset can be decomposed into two components:

- **An *annuity-like asset* that provides a stream of housing-services for life**.
  - An important part of the owner-retiree's standard of living;
  - Should generally be retained as a hedge of that significant part of retirement spending
- ***A fungible financial asset*, which is the house value at the retiree's death when the house's services are no longer needed.**
  - The residual home value can either fund part of the non-housing expenditures during retirement or be used for making gifts/ bequests.
  - The significant magnitude of its residual value makes the house a likely major funding source for retirement income and bequests in the future.

Reverse Mortgage is the Enabling Instrument to Utilize the Full Funding Potential of the House

The reverse mortgage [aka home pension] is a financial contract which permits the retiree to access the residual value of the house for funding both retirement income and efficient bequests/gifts

Core Features of the Contract

- **No interest or principal payments until the retiree's death.**
  - Thus, taking out a reverse mortgage does not expose retiree to the risk of losing his stream of housing services because of inability to make interest or principal payments
  - There are escrow requirements for property taxes and insurance on the house.
- **Non-recourse loan**
  - The retiree and, at the retiree's death, his estate (aka beneficiary) has the option to either pay accumulated interest plus principal and retain ownership of the house or abandon the house (without penalty) in full payment of what is owed.
  - In either case the house will be sold and converted into cash for the lender or for the estate which goes to the retiree's beneficiary.

How the Annuity and Reverse Mortgage Can Achieve a Good Retirement : Case 1 25th Percentile Income Example Age 65

$26,000 Income Retirement Goal $21,320 (82% replace) $30,000 in DC plan $150,000 house

Inflation-protected bond interest rate = 1.50% and life annuity inflation-protected rate = 5.40%

A.Social Security $15,340 + bond interest DC $450 = **$15,790 benefit (74% of goal)**

B.Social Security $15,340 + Annuity purchase DC $1,620 = **$16,960 benefit (80% of goal)**

Reverse mortgage principal = $81,300 (54%) Annuity income purchase= $81,300 x 0.054 = $4,390

C.Social Security $15,340 + Annuity purchase DC+RM $6,010 = **$21,350 benefit (100%)**

Benefit: Social Security 71% Annuity DC 8% Annuity Reverse Mortgage 21%

How the Annuity and Reverse Mortgage Can Achieve a Good Retirement : Case 2 50th Percentile Income Example Age 65

$50,000 Income Retirement Goal $36,000 (72% replace) $165,000 in DC plan $300,000 house
Inflation-protected bond interest rate = 1.50% and life annuity inflation-protected rate = 5.40%

A.Social Security $18,978 + bond interest DC $2,475 = **$21,453 benefit (60% of goal)**

B.Social Security $18,978 + Annuity purchase DC $8,910 = **$27,888 benefit (77% of goal)**

Reverse mortgage principal = $162,000 (54%) Annuity income purchase=$162,000 x 0.054 = $8,748

C.Social Security $18,978 + Annuity purchase DC+RM $17,658 = **$36,636 benefit (100%)**

Benefit: Social Security 52% Annuity DC 24% Annuity Reverse Mortgage 24%

How the Annuity and Reverse Mortgage Can Achieve a Good Retirement : Case 3 75th Percentile Income Example Age 65

$87,000 Income Retirement Goal $53,980 (62% replace) $229,000 in DC plan $500,000 house Inflation-protected bond interest rate = 1.50% and life annuity inflation-protected rate = 5.40%

A.Social Security $26,933 + bond interest DC $3,435 = **$30,368 benefit (56% of goal)**

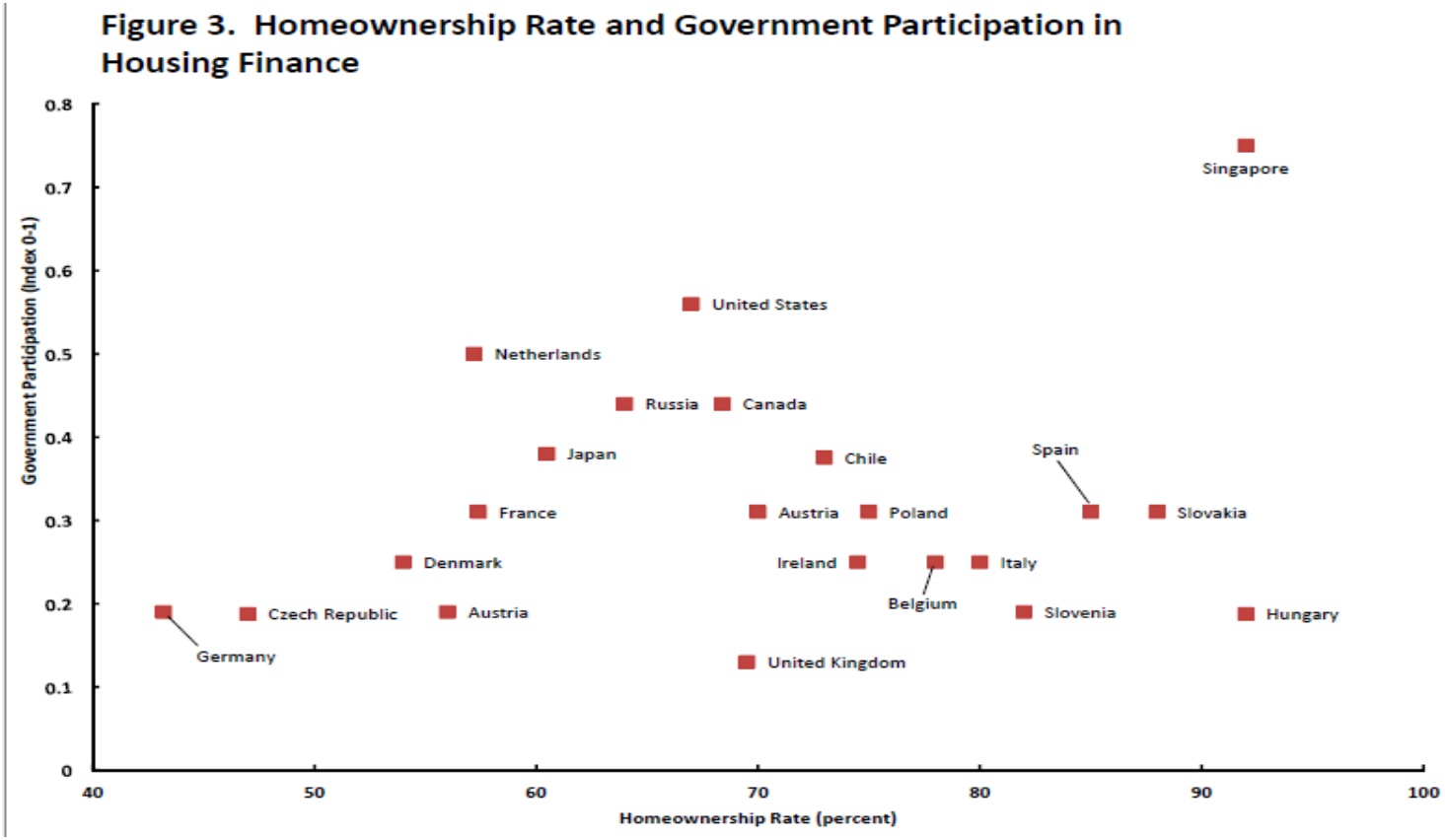
B.Social Security $26,933 + Annuity purchase DC $12,366 = **$39,299 benefit (73% of goal)**

Reverse mortgage principal = $271,000 (54%) Annuity income purchase=$271,000x0.054 = $14,634

C.Social Security $26,933 + Annuity purchase DC+RM $27,000 = **$53,933 benefit (100%)**

Benefit: Social Security 50% Annuity DC 23% Annuity Reverse Mortgage 27%

Homeownership is Pervasive - Making the Reverse Mortgage a Key Component of a Solution Globally



Campbell J.Y. Mortgage Market Design. *Review of Finance*. 2013;17 (1) :page 6.

Challenges to Current Reverse Mortgage Design Structure Substantial Changes are Required to Realize Its Potential

The reverse mortgage can materially increase lifetime income in retirement for working and middle-class retirees in developed and some developing countries

- Without requiring changes in personal saving behavior, retirement date or risk taking during the accumulation work years.
- Instead of seeking to increase the amount of retirement assets available, it makes more efficient use of the assets that retirees have.

The reverse mortgage is currently not widely used as a systematic part of retirement funding.

- A reason could be simply that currently retiring working- and middle-class workers have adequate retirement funding from Social Security and defined-benefit employer-plan – they do not need to tap their home equity value.
- If this is true today, it is not likely to continue to be the case as employer-provided benefits decline.

Challenges to Current Reverse Mortgage Design Structure Substantial Changes are Required to Realize Its Potential (continued)

A more probable explanation for the lack of widespread use is that the design of the reverse mortgage is materially flawed, for example with regards to:

- Government financed- In the US, there is no private-sector reverse mortgage market, only government-guaranteed HECM. Traditional credit institutions are not the most-efficient risk-bearing supplier of a well-designed contract
- Loan-to-value offered capped at lower than necessary levels
- Absolute cap on principal, amount independent of value of the house
- High cost of acquiring a reverse mortgage
- Marketing of the product;
- Dysfunctional, if well-intentioned regulations.

We observe:

- Long-term reductions in employer-funded benefits
- Unlikely increases in Social Security
- Longer life expectancy
- Difficulties in materially increasing personal saving behavior (in the absence of larger mandatory contributions)

There will likely be a huge global need for a better-functioning reverse mortgage market with the capacity to fund mortgages for the vast majority of retirees, reliably under all economic conditions.

Improving The Reverse Mortgage Design:
Benefits of Reverse Mortgage to Retiree & Beneficiary

- **Without the reverse mortgage**
  - Retiree gets the stream of housing services until death
  - Beneficiary gets the residual value of the house at the death of the retiree.

- **With the reverse mortgage**
  - Retiree maintains the stream of housing services until death
  - Retiree can use mortgage proceeds to purchase additional retirement income and/or to give his beneficiary an immediate cash gift at time of origination.
  - Whatever the use of the mortgage proceeds, the beneficiary receives a “call option” to buy the house at the time of the death of the retiree at an exercise price equal to the principal plus accumulated interest on the mortgage.

Demand Side: Retiree and Beneficiary Behavior with Reverse Mortgage

- **Central case – no beneficiary or no bequest motive**
  - The retiree should spend all the mortgage proceeds on a stream of additional income for life.
  - The retiree will prefer terms that maximize the mortgage proceeds.
  - Having determined the maximum benefit for the retiree, he/she can decide how much to reduce that benefit and provide for any gifts or bequests to beneficiaries as with an consumption good decision.
  - Note: Retiree with a "bequest" policy of giving only on his death shows *prima facie* evidence of "fear of outliving his assets" behavior more than of a desire to make a bequest, because the policy is so suboptimal for the beneficiary. Working and middle-class retirees are less likely to have a strong bequest motive than wealthier retirees. Bequests are a luxury good.

Demand Side: Retiree and Beneficiary Behavior with Reverse Mortgage (Continued)

- **The retiree should be relatively insensitive to the promised interest rate compared to a consumer for a regular mortgage.**
  - The retiree never makes any payments on the mortgage during his lifetime, no matter how high the promised interest rate on the mortgage: the rate does not affect the retiree's lifestyle.
  - The retiree will also be relatively insensitive to the choice between nominal or inflation-linked interest. This offers design flexibility to meet reverse mortgage investor preferences.
- **The retiree will be much more focused on getting high loan-to-value (LTV) on a reverse mortgage than consumers getting a regular mortgage earlier in the lifecycle.**
  - The retiree makes no principal or interest payments while he is alive. Therefore, his lifestyle is not affected by how much is owed on the reverse mortgage.
  - Meanwhile, the larger the loan size, the more retirement benefits and/or bequests /gifts he can purchase.

Demand Side : Retiree and Beneficiary Behavior with Reverse Mortgage (continued)

- **Impact on the Beneficiary**
  - The beneficiary receives immediate cash of the proceeds from the mortgage not used for retirement income, plus a call option to buy the house.
  - This instead of no cash and a “lottery ticket” to receive the market house value at an unknown moment in the future.
  - Lottery-- For the beneficiary to receive anything, the retiree has to die – this is presumably not something the beneficiary wants to happen.

- **Therefore, both retiree and his beneficiaries can almost always be made better off by taking a reverse mortgage than not.**
  - Its marketing needs to be designed to recognize that it is a “joint” sale to both the retiree and its beneficiaries.

Supply : Create Efficient Reliable Reverse Mortgage Funding

Innovation needed in contract design structure and efficient placement of the risk

- **The function served by the reverse mortgage for retirees is materially different from the standard mortgage for earlier-in-the-lifecycle households.**
  - It has different risks and different sensitivities to both the supply and demand side than traditional mortgage for earlier lifecycle phases.
  - It should not be considered simply "another "mortgage product to be designed, managed and regulated in the same fashion as traditional mortgages.

- **The financing availability for reverse mortgages must be deep and reliably available in all economic conditions if it is to become a mainstream systematic source of retirement funding.**

  - To achieve this, the risk-bearing financing base should not be "opportunistic" investors who are sensitive to the rate of return on the asset but instead be placed in the "core" [aka indexed] equity holdings of large institutions that are focused on diversification and accept market returns whatever they are.

  - The focus on diversification ideally provides for a global base of investors. Relative to standard mortgages, the reverse mortgage characteristics could make it more attractive to international investors.

  - In particular, its no-recourse feature makes it a pure asset-backed financing unlike standard mortgages that are a mix of personal credit and asset–backed which is more complex and requires more local expertise.

Supply: Create Efficient Reliable Reverse Mortgage Funding

Innovation needed in contract design structure; efficient placement of the risk (continued)

- **The placement of risk would be greatly enhanced by securitizing the mortgages into a pool and issuing tranches tailored to specific investor habitats.**
  - Because no principal or interest is paid prior to the retiree's leaving the house (at his death), the mortgages in the pool will have much longer duration than ordinary mortgages.
  - If the mortgage promised interest rates are indexed to inflation, then these mortgages will have both long-duration and inflation-protection.
  - Because a well-designed reverse mortgage will have significantly greater default risk than a regular mortgage at origination, traditional credit-granting institutions are not the best holder of the default risk, and it will improve efficiency to shift that risk to a better-suited holder of that risk

- **A senior debt tranche** with virtually no exposure to the house asset prices underlying the mortgages in the pool would be very attractive to long-horizon investors .
  - For pension funds and insurers, this would serve as a hedge for their annuities and pension liabilities.
  - For mutual funds used by financial advisors, this would provide long-duration, high quality, inflation-indexed fixed-income exposure.

Supply: Create Efficient Reliable Reverse Mortgage Funding

Innovation needed in contract design structure; efficient placement of the risk (continued)

- **An equity tranche which bears virtually all the house asset price risk should not be marketed to fixed-income investors.**
  - Instead it should be marketed to equity asset managers as a new and very large asset class which currently asset managers do not own.
    - The asset class is owner-occupied residential housing, which has an enormous total market capitalization and thus should be held in significant amounts in any well-diversified "market" or core-asset portfolio.
    - What would be viewed as "toxic risk" by the typical loan officer or fixed-income asset manager becomes attractive diversifying risk to a equity asset portfolio.
    - By focusing on the large diversification benefits for core [aka indexed] equity part of the institutional portfolio, the supply of risk-bearing funds for reverse mortgages is made most reliable [available independent of market conditions] and the scale of funds available maximized.

- **A subordinated debt tranche** could also be created.
  - This would fill the niche currently filled by corporate and other credit-risky bonds, if insurance companies or other institutions have a habitat appetite for taking tail risk similar to corporate and hi-yield bonds.

Summary: Reverse Mortgage Design Structure

The financing of reverse mortgages needs to be transformed away from government and traditional private-sector credit-institutions bearing the risk of default to private-sector institutions that can take substantial equity-like risks, with a global financing market.

- Banks could continue to be originators/distributors of reverse mortgages.
- Using current institutions and institutional practices, reverse mortgages could be packaged with simple tranches of senior bankruptcy-remote debt and equity.
- The senior debt would have pension funds and insurance companies that write life annuities as natural demanders.
- The equity piece should be placed globally with the “core [aka indexed] equity” part of large financial institutions [pension funds, insurance companies, sovereign wealth funds, mutual funds], which are typically invested in all asset classes, independently of market conditions, and do so for diversification reasons. This assures stability and scale of supply of reverse mortgage funds.

Flexible Spend-Down Strategies in Retirement

Four components of income provision in retirement: secure standard of living, liquidity, growth goal, and bequests

1

Guaranteed income for life

- Annuity, Social Security, Defined Benefit Pension

2

Conservative draw-down income (minimum-risk income)

- Not guaranteed
- No longevity protection
- Provides liquidity and bequest opportunities

3

Desired income growth goal

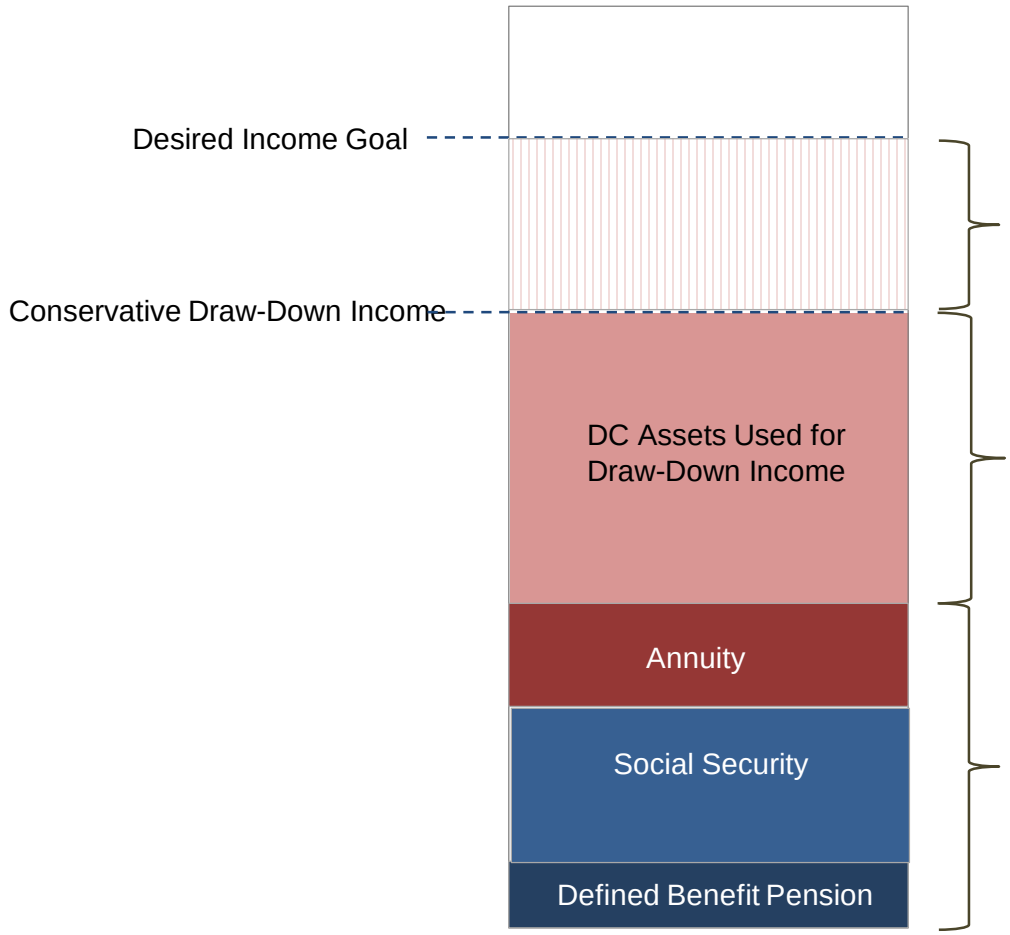
- Targeted increase in income beginning at specified later date in retirement

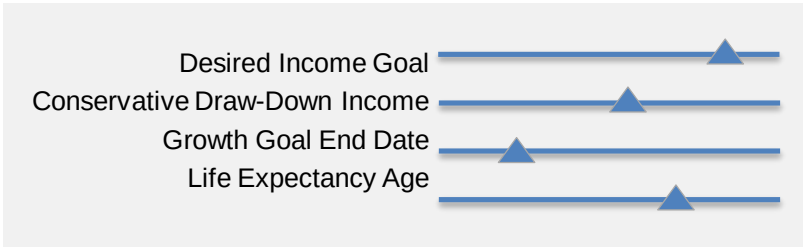
4

Longevity tail-risk insurance

- Guaranteed income for life > age 85

Retirement Income Post-Accumulation Phase Transit Smoothly from Accumulation Phase





LEVEL 3 – Desired Income growth goal

- Portion of savings allocated to equities
- Targeted increase in income to begin at specified date
- Added to Level 2 income when goal is achieved

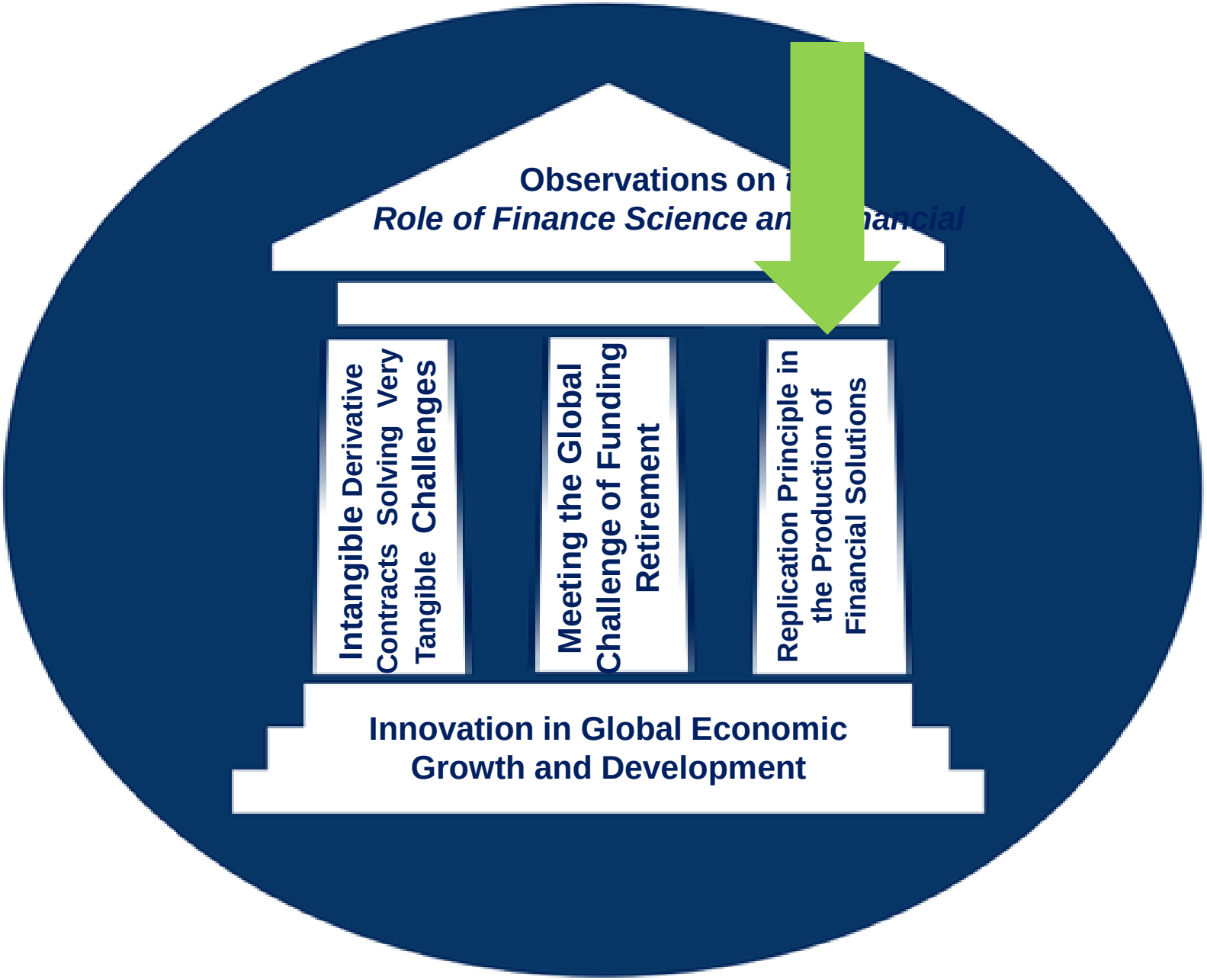
LEVEL 2 – Conservative Draw-Down Income

- Provides minimum-risk income for a set time period
- Provides liquidity and flexible bequest opportunities
- Not guaranteed - No longevity protection

LEVEL 1 – Guaranteed income for life

- Combination of state benefits, defined benefit pension plan, and annuity (if available)

Solution Features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Intangible Derivative Contracts Solving Very Tangible Challenges
Meeting the Global Challenge of Funding Retirement
Replication Principle in the Production of Financial Solutions
Innovation in Global Economic Growth and Development

Appendix:
Supply: Create Efficient Reliable Reverse Mortgage Funding
Innovation needed in contract design structure; efficient placement of the risk (continued)

Versus a forward sale or renting, there is lower moral hazard risk because the retiree/estate retains an equity stake and because the retiree doesn't know how many years he will be living in the house.

- **Little mortality risk.** Although the mortgage buyer is exposed to mortality uncertainty, the risk exposure is different than the one faced by an annuity issuer.
  - The mortgage holder is compensated at the promised interest rate (which can be quite high) for every year the mortgage remains outstanding. Also, the house value as an asset has expected growth.
  - In contrast, the annuity underwriter is stuck making payments with no further compensation beyond the original annuity purchase price.

- **Litigation and reputation risk** - lower with a reverse mortgage than standard mortgage for originator/ buyer
  - No foreclosures or retirees being evicted;
  - "No-fault" default - the estate has a contractual option to repay the loan or give up the house.
  - With no direct equity participation and the retiree/estate retaining the call option, no future litigation risk if housing prices should go up dramatically in value, *expost*.

Create Efficient Reliable Supply of Reverse Mortgage Funding

Innovation needed in contract design structure; efficient placement of the risk (Continued)

More Innovations for Reverse Mortgage

- **Customization for the retiree**
  - The retiree could select to receive a stream of custom-tailored monthly payments. For example, 20 years from age 65 to age 85.
  - In addition, the retiree can use a lump-sum from the proceeds at origination to purchase a deferred life annuity which begins payments at age 85. This would be a form of “tail” longevity insurance that prevents the retiree from “outliving” his assets.

- **Expansion of the Loan-to-Value (LTV)**
  - Could be achieved by using a portion of the proceeds to pay for a life insurance policy on the retiree which pays to the holder of the reverse mortgage to cover part of repayment of principal and accumulated interest

Create Efficient Reliable Supply of Reverse Mortgage Funding

Innovation needed in contract design structure; efficient placement of the risk (Continued)

HEFI: Additional Innovation to Access Equity Value of House for Retirement

Home Equity Fractional Interest (HEFI) "Beyond Mortgages: Equity Financing for Homes", H. Leland, FIRS Conference, Lisbon, June 2016

- HEFI is a call-option-like security:
  - Payoff at the termination date T = K(T) [0, H(T) – E(T)], where
    - H(T) = market value of the house at time T;
    - E(T) is the mortgage principal plus accumulated compound interest payments at time T
    - K(T) is a contractually specified fraction 0<K(T)<1 at time T.

- The termination (exercise) date T is the first date of sale, default, cash-out refinancing, voluntary or death termination.

- Unlike a call, the issuer of HEFI, the retiree --not the purchaser– determines when to "exercise", and hence the retiree controls termination.

Create Efficient Reliable Supply of Reverse Mortgage Funding

Innovation needed in contract design structure; efficient placement of the risk (Continued)

Comparing & Combining the Reverse Mortgage (RM) and HEFI

- Combining a RM and a HEFI offers great flexibility for customized solutions as to
  - The amount of funding extracted from the house asset for the retiree and beneficiary and
  - The risk exposures taken by them to house prices.

- Both RM and HEFI provide means for the retiree to extract funding from the house. The risk characteristics to the retiree and beneficiary of each are different.
  - The non-recourse RM provides the retiree and beneficiary with limited downside risk of loss and unlimited upside potential from the house.
  - The HEFI provides the retiree and beneficiary with full downside risk and limited upside potential from the house.
  - The HEFI can be used to expand the amount of funding beyond what the RM can provide because of institutional rigidities such as usury laws, tax rules and consumer finance regulation.