



# 3º SEMINÁRIO INTERNACIONAL DE PREVIDÊNCIA COMPLEMENTAR

## Modern Fair Tontine Pensions

Realização:



Patrocínio:



Apoio:



## The defined contribution system retirement challenge

Retirees lack the knowledge and skill to manage portfolio drawdown

Under-saving means many will seek higher yields

Traditional investment withdrawal strategies are highly uncertain (longevity risk)

Traditional annuitization is opaquely priced and often perceived as expensive

Insured annuity markets in many countries are dysfunctional or even nonexistent



*“...In countries where it is usual for government to raise money by granting annuities, tontines are upon this account generally preferred to annuities...”*

~ Adam Smith, The Wealth of Nations, 1776



A longevity risk pooling arrangement, in which investors irrevocably:

- Agree to pool their money (or something of value)
- Receive payouts while they are living
- Forfeit their accounts upon death to the surviving members

Two sources of returns:

- Investment income
- “Longevity credits” from the balances of members who have died

Those who live longer receive greater cumulative payouts



## Simple example: Closed pool, fixed term



Imagine 8 people investing \$10,000 each

They purchase \$80,000 worth of 10-year Treasury bonds that pay an annual coupon rate of 2%

So, the investment income each year is  $\$80,000 \times .02 = \$1,600$

At the end of Year 1:

- All 8 are still alive
- Each member receives:  
Coupon interest of  $\$1,600 / 8 = \$200$  (2.00% yield)



## Simple example: Closed pool, fixed term

In year 2, one person dies

At the end of Year 2:

- Only 7 are still alive
- Each member receives:  
Coupon interest of  $\$1,600 / 7 \cong \$229$  (2.29% yield)



## Simple example: Closed pool, fixed term



By year 10, three persons have died

At the end of Year 10:

- Only 5 are still alive
- Each member receives:
  - Coupon interest of  $\$1,600 / 5 = \$320$  (3.20% yield)
  - Maturity value of  $\$80,000 / 5 = \$16,000$  (60% gain)



Closed pool tontines are a bit like lotteries, where the last survivors win big

- Lotteries are greatly appealing to many
- But lottery-like payoffs are not ideal for retirement income

We can design tontines that are more like pensions:

- Open-ended, continually accept new participants, running in perpetuity
- Payouts designed to smooth consumption (rather than increase exponentially)

Notably, tontine pensions would naturally be 100% funded at all times





Longevity risk may be decomposed into:

- Idiosyncratic (individual) mortality

How long might I live?  
Age 70? 80? 90? 100? 110? 120?  
Highly uncertain, a very wide range

Consequences of getting it wrong is big!

- Systematic (aggregate) mortality

What if the *aggregate* population lives longer or shorter than expected?  
Life expectancy unexpectedly increases by 1 year? 2 years?  
Much less uncertain, within a much narrower range

Consequences of getting it wrong is relatively small  
*(except for insurance companies and defined-benefit plans... for them it is big!)*



Tontines combine an investment with a payout scheme

- Investment is irrevocable (typically)
- Upon death, balances are transferred to surviving tontine members
- Investors collect a longevity yield for as long as they survive

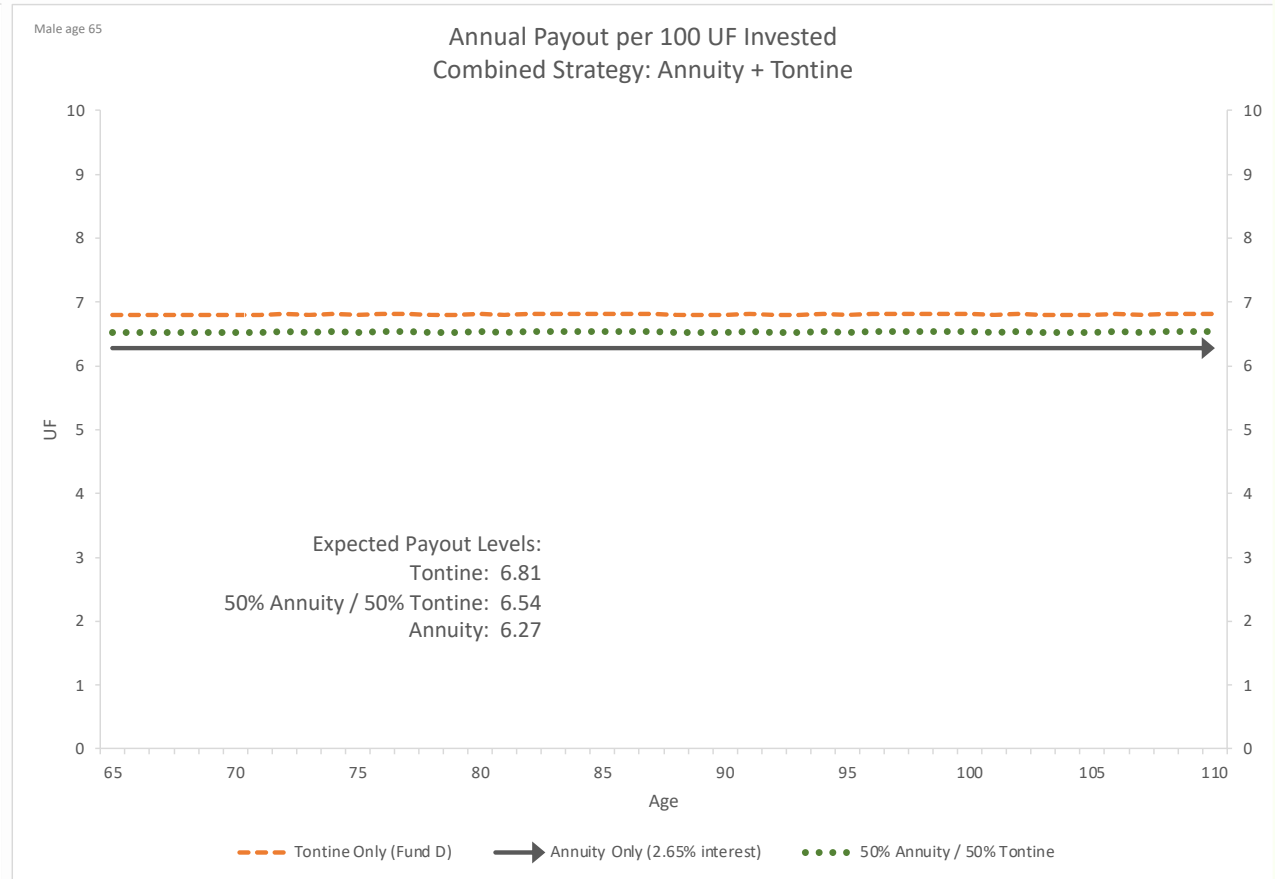
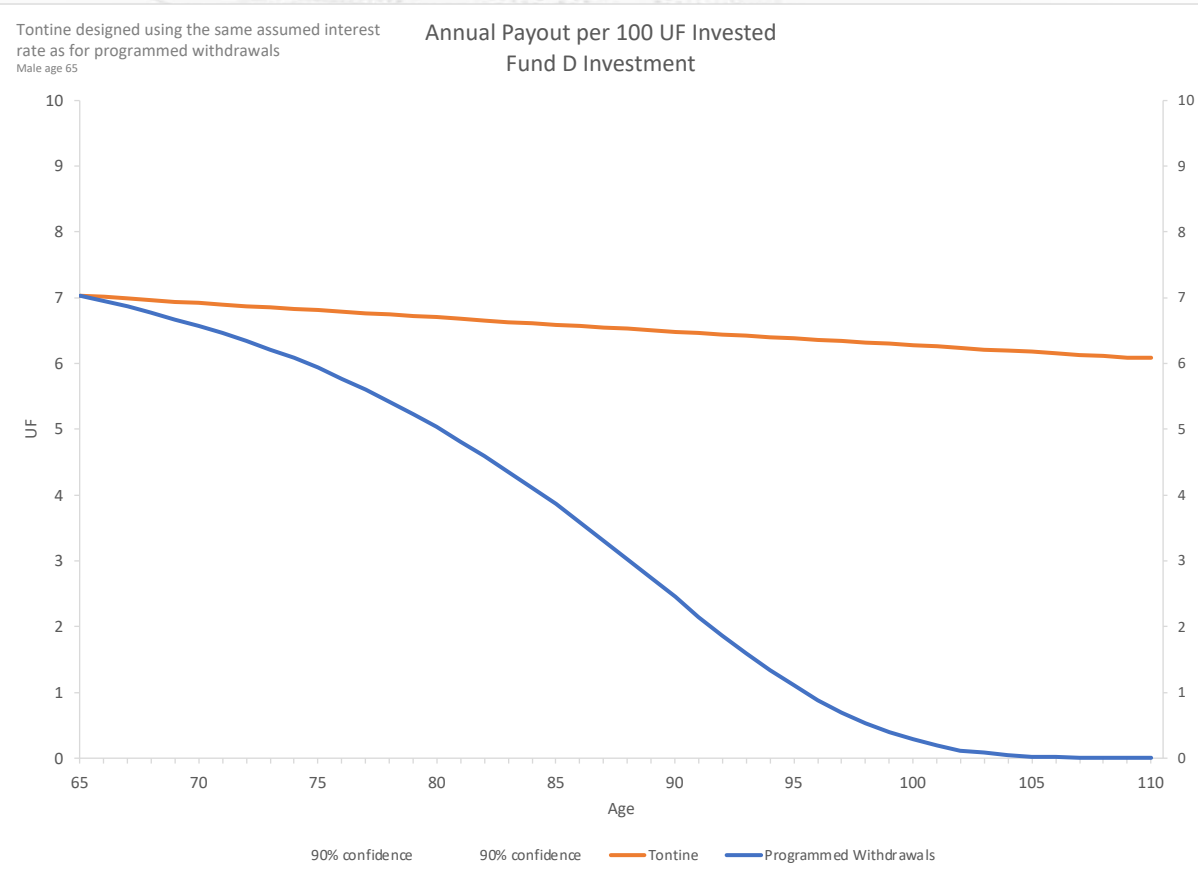
Tontines pool and diversify individual longevity risk

- No third-party guarantor/insurer
- No guarantee premiums, no reserves, no counterparty risk

Payouts self-adjust to ensure the tontine remains fully funded at all times

Think of tontines as *actuarially-fair, non-insured* annuities





Source: Olga Fuentes, Manuel Garcia y Richard Fullmer (2021), con datos de la Superintendencia de Pensiones, Chile  
 “A Sustainable, Variable Lifetime Retirement Income Solution for the Chilean Pension System”

In defined-benefit and guaranteed annuity economics:

- The payouts are defined as liabilities
- Stakeholders argue about how to value these liabilities
- The funded ratio is the variable

$$\text{Funded Ratio \%} = \frac{\text{Assets}}{\text{PV}(\text{Payout Liabilities})}$$

Tontines turn the balance sheet economics around:

- There are no such liabilities
- The funded ratio is a constant 100% (fully funded)
- The payouts are the variable

$$\text{PV}(\text{Payouts}) = \frac{\text{Assets}}{100\%}$$



# The retiree's dilemma: invest or insure?

## Self Drawdown

Longevity risk pooling  
Longevity credits  
Third-party guarantee

Irrevocable  
Guarantee costs  
Counterparty risk

Full control

## Guaranteed Annuity

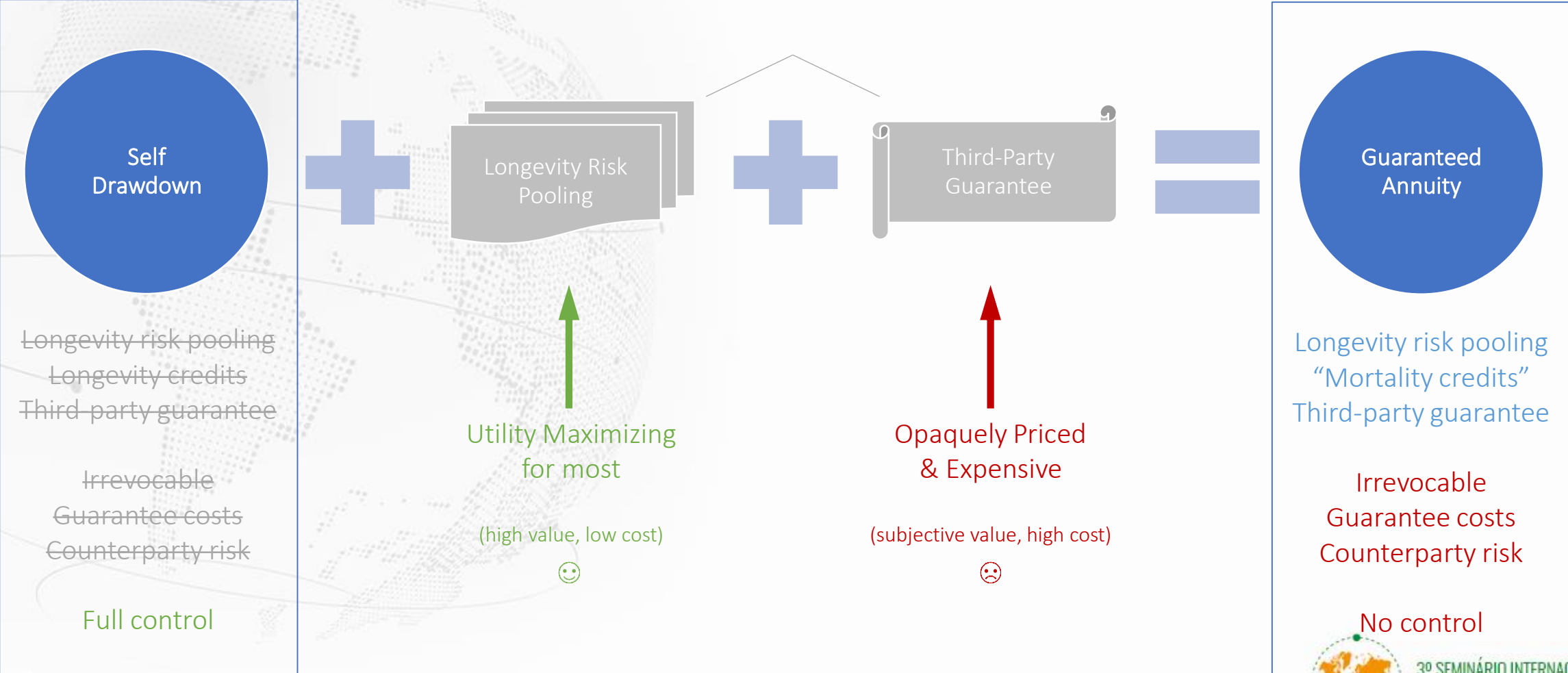
Longevity risk pooling  
"Mortality credits"  
Third-party guarantee

Irrevocable  
Guarantee costs  
Counterparty risk

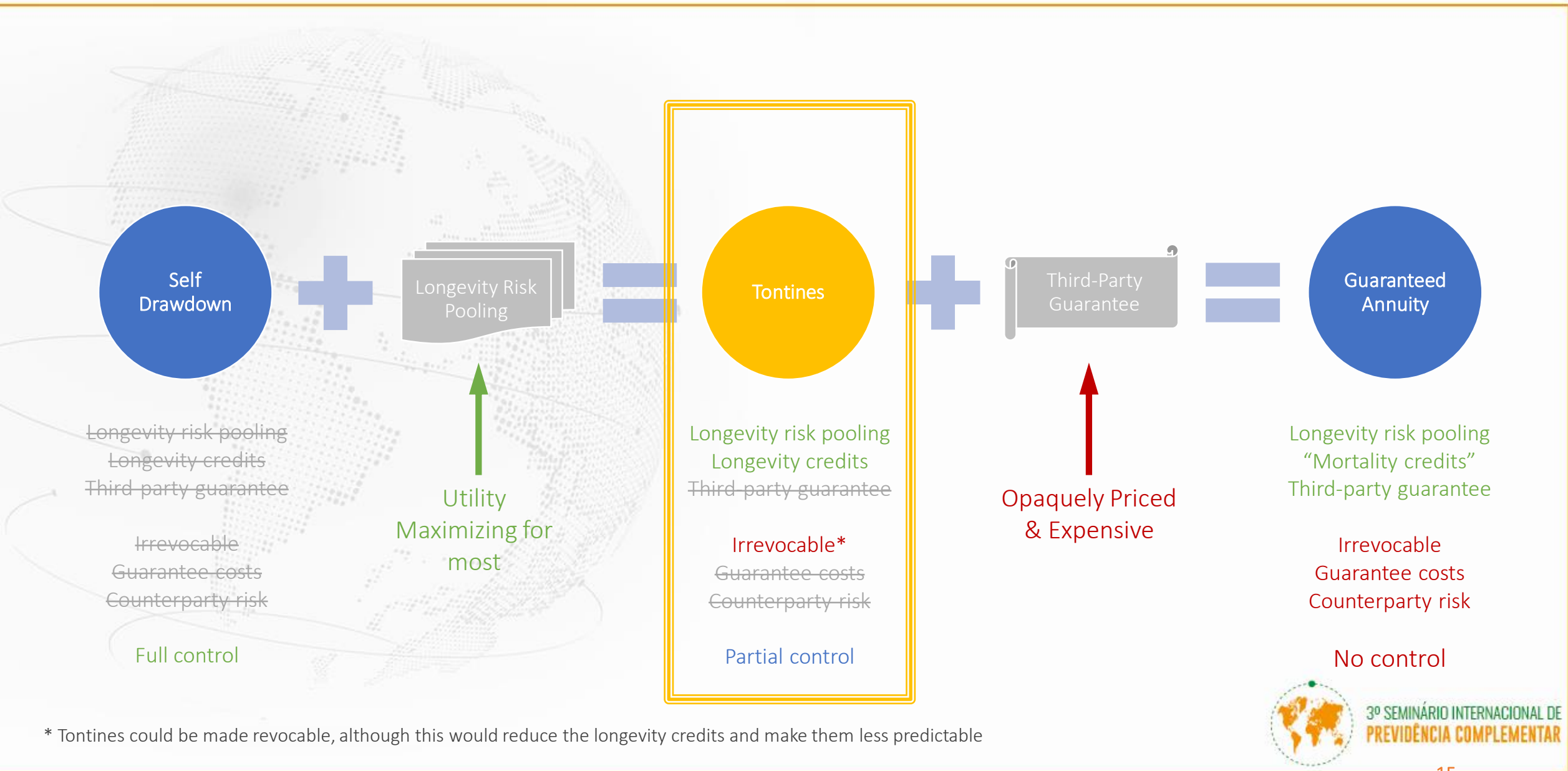
No control



# Commercial annuities embed two components



# Tontines: High value, low cost



## Another way to look at it

### Self Drawdown

Access to savings

Access to equity  
risk premium

### Life Annuity

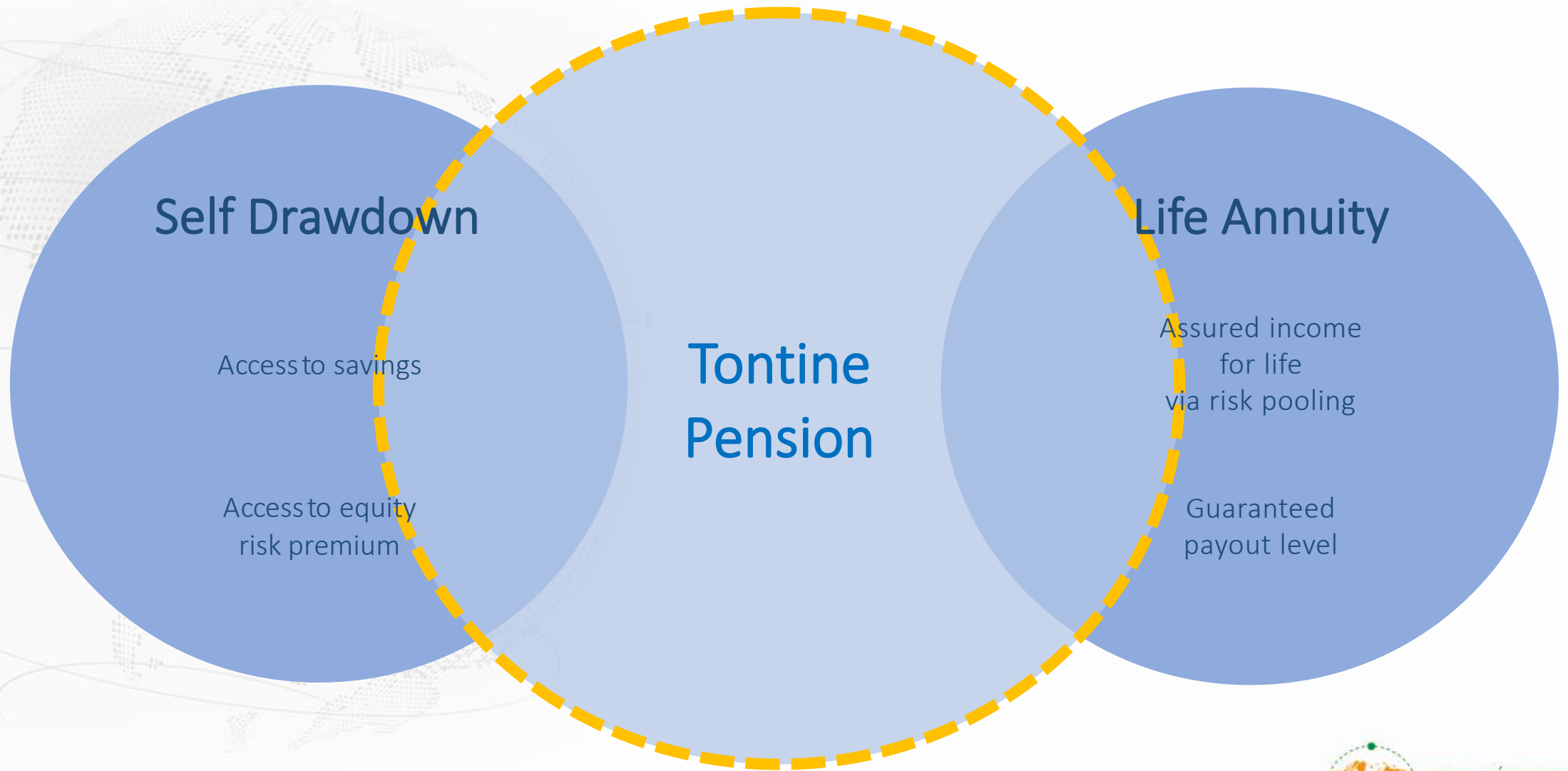
Assured income  
for life  
via risk pooling

Guaranteed  
payout level

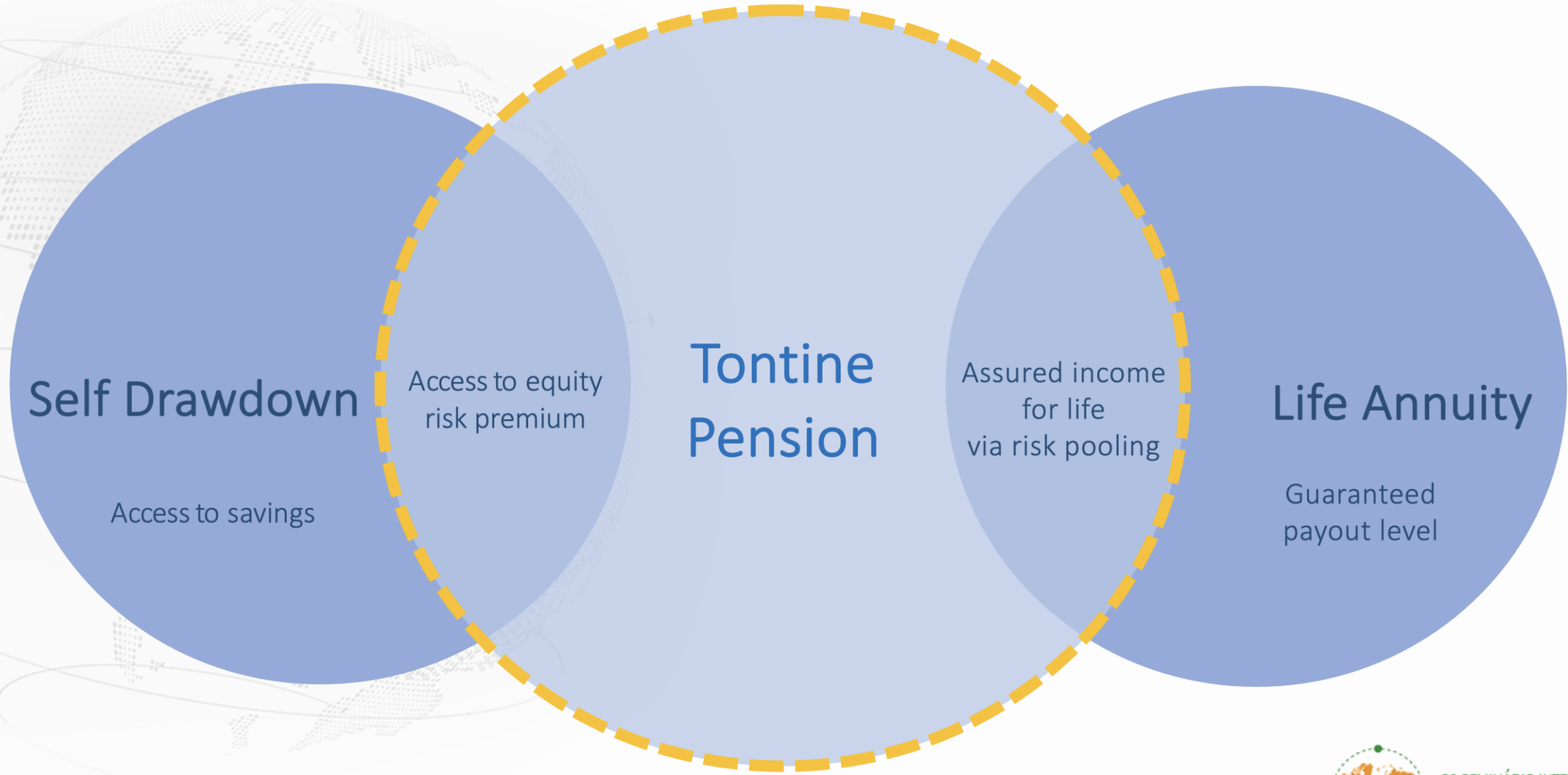




## Another way to look at it



## Another way to look at it



Tontines can support numerous types of payout options, including:

- Single or joint ownership
- Immediate lifetime
- Deferred lifetime
- Payouts over a fixed term
- Lump sums after a fixed term

Payout trajectories can be flat, increasing, or decreasing

Partial bequests are possible

Individuals may make their own choices



A bet is fair when each party's expected gain/loss is zero



Roll the number “6” on a die:

- There is a  $\frac{5}{6}$  chance of losing and a  $\frac{1}{6}$  chance of winning
- Fair when the amount gained by winning is 5 times the amount forfeited by losing
- The expected gain per dollar/real staked is  $\underbrace{\left(\frac{5}{6} \times -1\right)}_{\text{lose}} + \underbrace{\left(\frac{1}{6} \times 5\right)}_{\text{win}} = 0$



A tontine is fair when the expected value of each member's "tontine gains/losses" is zero at all times

- The gains are the longevity credits received while living
- The loss is the balance forfeited at death

Unlike CDCs, there are no intergenerational transfers that may advantage some generations over others

By maintaining strict actuarial fairness and a strict fully-funded budget constraint...

... modern tontines are truly sustainable forever



It is a better deal for retirees:

- An insurer must charge a higher price than fair to cover their risk margins
- Lower cost means that tontines deliver higher payouts, on average

Evidence that people shun financial products that they perceive as unfair

Actuarially fair design is what allows:

- The mixing of different ages, genders, and investment amounts
- The freedom to choose between different investment and payout options
- Open-endedness such that new participants can join at any time



The word “tontine” has negative connotations

- 20<sup>th</sup> century scandals involving the insurance industry
- Fictional narratives
- Spanish and Portuguese translations – tonto

Solutions: transparent accounting, anonymized memberships pools, call it by another name

Adverse selection (also true for life annuities)

Solutions: incentivize participation, build adverse selection into mortality rates

Behavioral biases:

- Preference for bequest
- Preference to retain control rather than to share risks

Solutions: joint-ownership, bequest options, deferred payout options, partial use



A truly sustainable lifetime income solution for defined contribution plans

Automatic self-adjustments to reflect *actual* investment and longevity experience

A nonnegative and uncorrelated longevity yield on top of a member's underlying investment return

A low-cost way to obtain extra income without taking additional investment risk

The freedom to invest as desired

The freedom to select from a variety of payout options based on preferences and needs







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**Thanks!**

**Richard Fullmer**

Nuovaldo Ltd / Nuova Longevità Research

Realização:



Patrocínio:



Apoio:

