From Tontines to Annuities (in 20 minutes)

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Tontines in the news: Canada's 2019 Budget

Budget 2019 proposes to amend the tax rules to permit PRPPs and defined contribution RPPs to provide a variable payment life annuity (VPLA) to members directly from the plan. A VPLA will provide payments that vary based on the investment performance of the underlying annuities fund and on the mortality experience of VPLA annuitants.

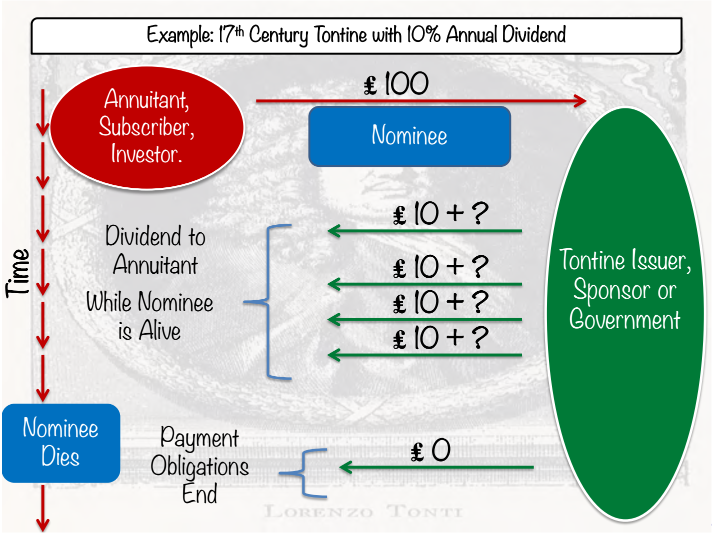
Annuities fund

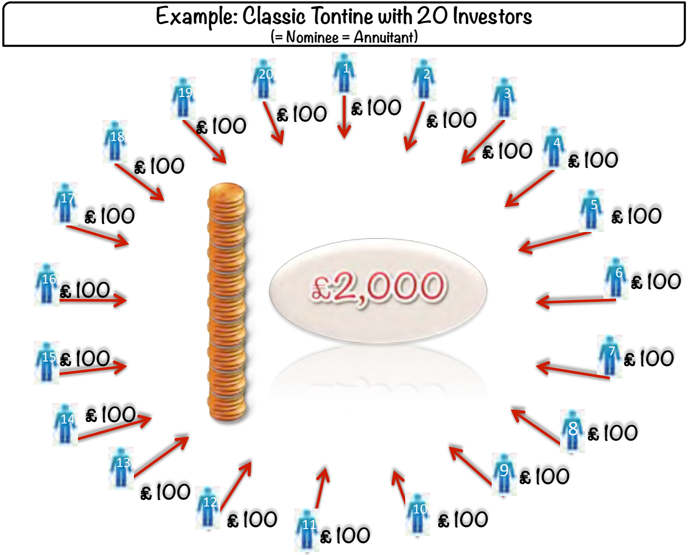
PRPP and defined contribution RPP administrators will be permitted to establish a separate annuities fund under the plan to receive transfers of amounts from members' accounts to provide VPLAs. Only transfers from a member's account will be permitted to be made to the annuities fund. Direct employee and employer contributions to the annuities fund will not be permitted.

A minimum of 10 retired members will be required to participate in a VPLA arrangement in order for a plan to establish such an arrangement and it must be reasonable to expect that at least 10 retired members will participate in the arrangement on an ongoing basis.

Long-term borrowing by English & French government.

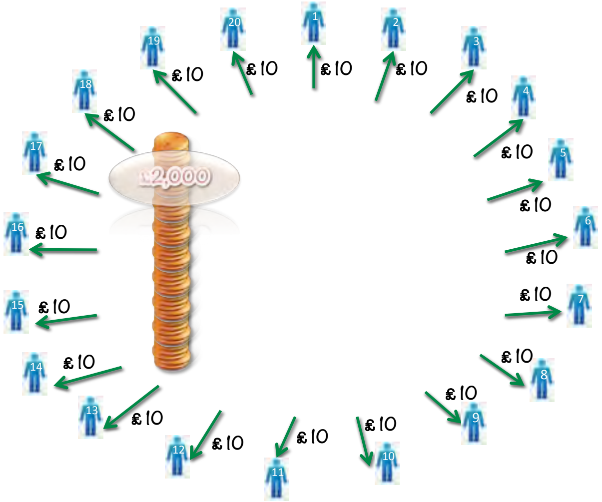
Back in the 17th Century



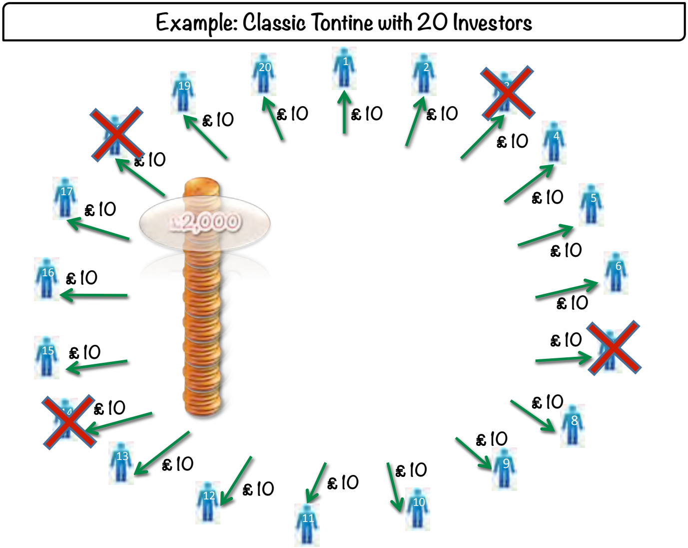

Example: Classic Tontine with 20 Investors
(= Nominee = Annuitant)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
£ 100
£2,000

While Everyone is Alive

Example: Classic Tontine with 20 Investors



After Some Deaths



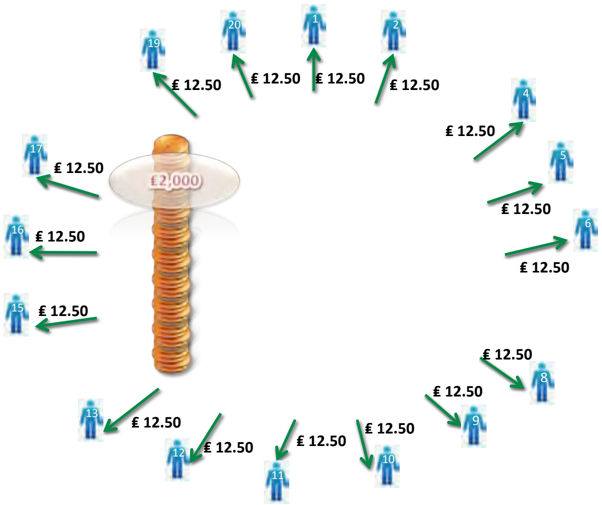
Computing the dividend per tontine share...

With 16 investors alive and 4 investors dead, the dividend calculation is:

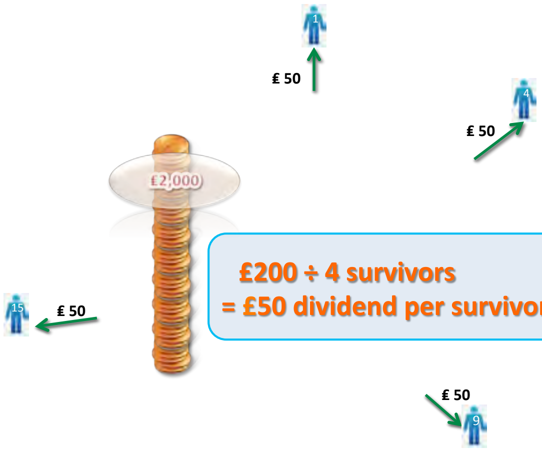
$$\frac{£200}{16} = £12.5 = £10 + £2.5$$

Dividend is (i.) interest of 10% plus (ii.) mortality credits of 2.5%.

Dividend per Share

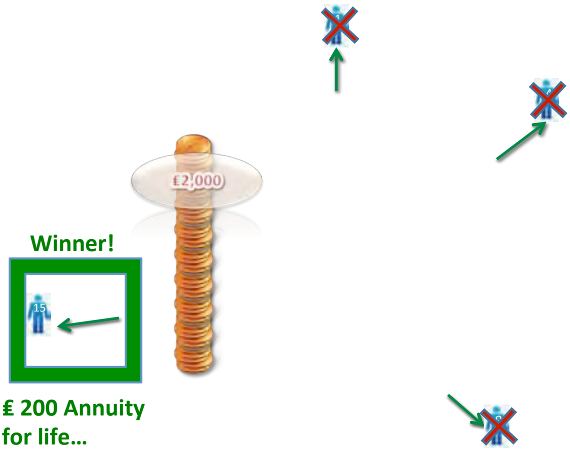


Dividend per Share: 4 Investors Remaining in the Pool



£200 ÷ 4 survivors
= £50 dividend per survivor

Dividend per Share: The Last One Standing



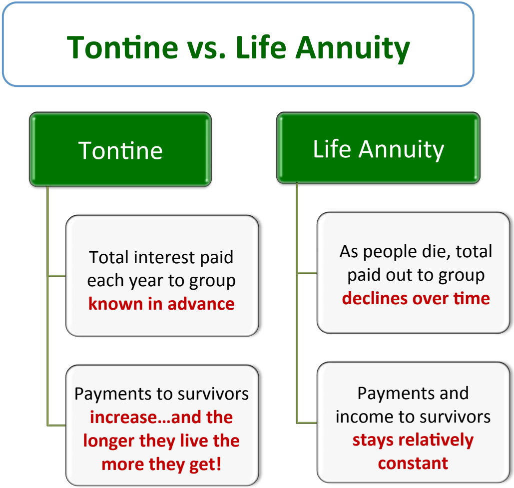
What Happens to the Principal?

...It is gone!

The (Expected) Payout Structure of Lorenzo's Tontine

Not Very Optimal Looking...

Compare & Contrast: Tontine vs. Life Annuity

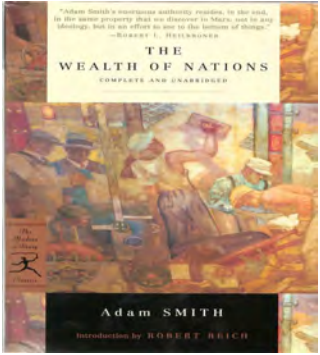


Endorsement by the Greatest (or First) Economist

Written in the late 18th Century

Adam Smith:

"Tontine Appeals to the Gambling Instinct"



"…from the confidence which every man naturally has in his own good fortune, the principle upon which is founded the success of all lotteries, [the tontine] annuity generally sells for some-thing more than it is worth. In countries where it is usual for government to raise money by granting annuities, tontines are upon this account generally preferred to annuities for separate lives…"

Endorsement by the Greatest (or First) Treasury Secretary

Written in the late 18th Century

Alexander Hamilton's Tontine Proposal

Robert M. Jennings, Donald F. Swanson and Andrew P. Trout
The William and Mary Quarterly
Vol. 45, No. 1 (Jan., 1988), pp. 107-115

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Topics: Tontines, Life annuities, Public debt, Interest, Mortality, Interest rates, Credit, Annuities, Sinking funds, Age groups

Tontine or Life Annuity

Which Would You Select?

Imagine you are about to retire and are (only) given a choice between a 14% life annuity and a tontine paying 8%. Which would you select?

What would (rational) choice depend on?

- Your health relative to the tontine pool.
- Credit rating of the insurance company.
- Risk aversion & consumption preferences.
- Pricing and the term structure of interest rates.
- Long-term inflation expectations

Some More Annuity Puzzles...

What do people actually buy?

Income Annuity Type	**Q1.2019**	**Q4.2011**
For Life Only (*No guarantee*)	14.4%	25.3%
Life with Guarantee Period	36.2%	56.2%
Cash or Installment Refund	49.4%	18.5%
TOTAL	**100%**	**100%**

Data: Cannex Financial Exchanges (April 2019). **U.S. Data.**
Analysis: Moshe A. Milevsky

Some More Annuity Puzzles...

Does anyone worry about inflation?

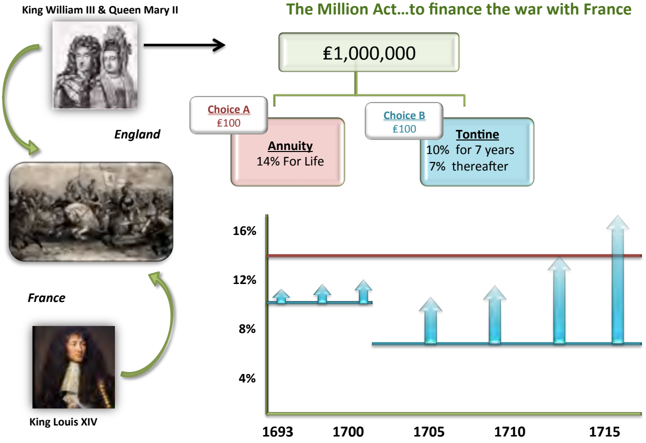
Inflation Indexed Income	**Q1.2019**	**Q4.2011**
Not Requested	97.0%	96.0%
CPI-u Index	0.0%	1.0%
COLA	3.0%	3.0%
TOTAL	**100%**	**100%**

Takeaway: Only economists buy real annuities.

Data: Cannex Financial Exchanges (April 2019). **U.S. Data.**
Analysis: Moshe A. Milevsky

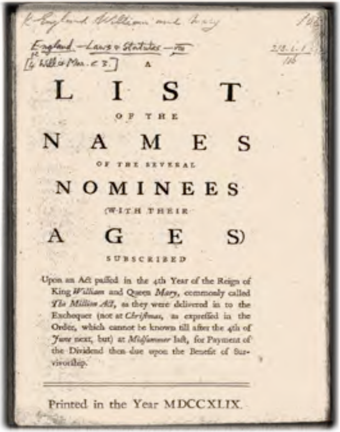
Tontine vs. Annuity Choice isn't Hypothetical...

In the year 1693 investors in England were given this exact choice



Annual Reports & Dividend Statements

Documents Stored in the National Archives and British Library



England William and Mary

England — Laws & Statutes —

[4 Will & Mar. c 3.]

A

L I S T

OF THE

N A M E S

OF THE SEVERAL

N O M I N E E S

(WITH THEIR

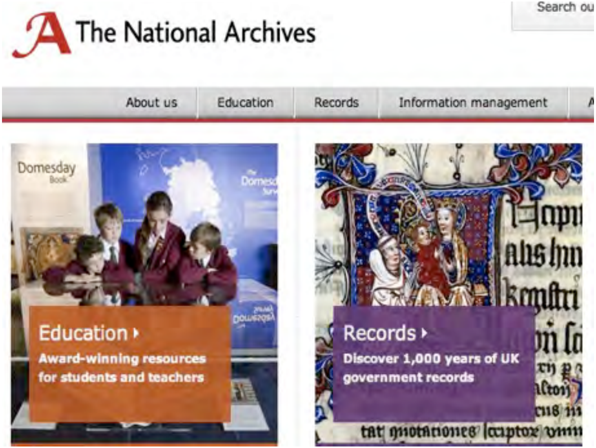
A G E S)

SUBSCRIBED

Upon an Act passed in the 4th Year of the Reign of King *William* and Queen *Mary*, commonly called *The Million Act*, as they were delivered in to the Exchequer (not at *Christmas*, as expressed in the Order, which cannot be known till after the 4th of *June* next, but) at *Midsummer* last, for Payment of the Dividend then due upon the Benefit of Survivorship.

Printed in the Year MDCCXLIX.

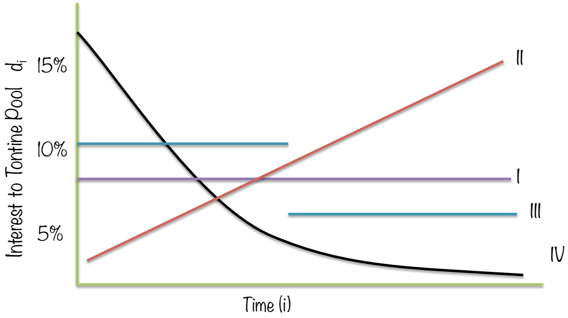
Thanks to The National Archives (UK)



An Optimal (Natural) Tontine's Payout to the Syndicate

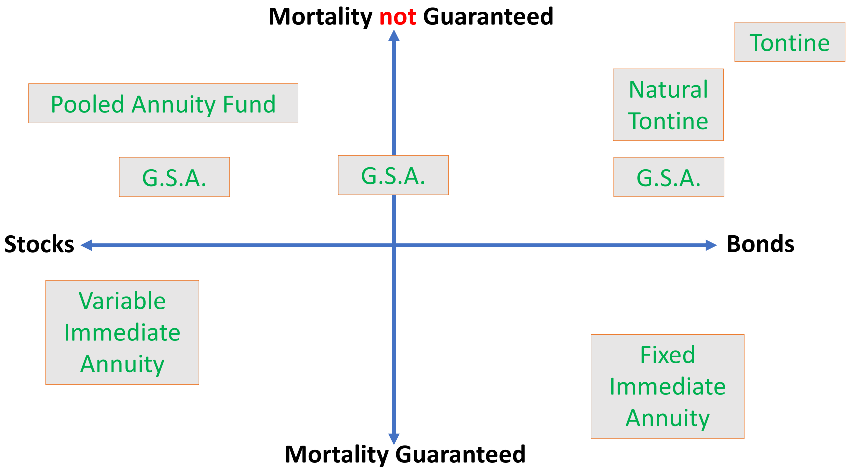
Some quick intuition

Many ways to design a tontine in which the PV of the guaranteed dividends is equal to the original contribution.



IV = Optimal Tontine....

Longevity-contingent Claims: A Typography



Conclusion and Final Thoughts
In 60 Seconds...

- **Note:** Tontine thinking is more important than tontine structure.
- Remember that insurance companies charge for absorbing longevity risk and the (capital) cost will continue to increase over time. Do consumers really want all their *systematic* mortality risk eliminated?
- Offer a portfolio choice between (i.) sharing systematic longevity risk with others, and (ii.) transferring the risk to an insurance company.
- At the very least, explain the tontine first, which might **nudge** people towards annuities...