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Communication and self control of a pension saver's financial risk

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Merton (2014):

Our approach to saving is all wrong.

- Monthly income, not net worth.
- Do not make employees smarter about investments. We need smarter communication.
- Balancing the portfolios.
  - Take risk out of the portfolio once the goal is achieved. Avoid achieving goal only to fall below if markets go down.
  - Minimum guaranteed income.

In this first talk of the project, we only consider the simple lump sum case.

Hence, we only consider the last two of Merton’s points.

We consider four different people:

- Lisa: The risk taker
- John: The moderate risk taker
- Susan: The moderate risk averse
- James: The risk averse

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In a power utility world, Lisa, John, Susan, James would have parameters

$$\rho = -0.25, -1, -4, -10,$$

respectively.

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In a non-hedged power utility world without guarantees and other safety measures the investment in stocks would be

	Lisa	John	Susan	James
Percentage in Stocks	75%	46%	19%	8%

We will suggest an approach where a simple question to Lisa, John, Susan and James will tell us what kind of risk they want.

We hedge by optimizing the median return given some guarantee.

All numbers are in 2017 - values, i.e., adjusted for inflation.

In later work to be presented next May 2018, we will argue how such an inflation-hedged lower bound is possible in our pension universe.

- We only consider the simple lump-sum case.
- Lisa, John, Susan and James want to invest £10,000.
- 30 years of investment

THE COMMUNICATION

- Your investment has a best-case (BC) and a worst-case (WC).
- You will never drop below your WC.
- Half-the-time you will get the BC and the other half-of-the-time you will get an investment result between WC and BC.
- Use a slider to see which WC suits you best.

  For every WC their is a link to a BC.

  And the BC increases when the WC decreases.

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Which WC will the risk taker Lisa pick?

- £3,900
- £6,400
- £9,100

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Which WC will the risk taker Lisa pick?

- **£3,900**
- £6,400
- £9,100

What is the corresponding BC?

- £12,320
- £15,320
- £16,470

What is the corresponding BC?

- £12,320
- £15,320
- **£16,470**

Lisa's pick:

Goal: £16,470

Forecast: Half of the times you will achieve this goal.

More is not possible. Guarantee: £3,900.

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Lisa’s median in the un-hedged world, where she holds 75% in stocks would be

Median = £13, 496

With the new hedging strategy

Lisa’s median = £16,470

- Lisa has increased her median by £2,974.
- She also has a guarantee of £3,900 (Compare to no guarantee before)
- The price is no upside above £16,470.

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In other words: Lisa has sold her upside above £16,470 to secure a guarantee and a higher median.

What did the others pick….

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	Lisa	John	Susan	James
WC (Guarantee)	£3,900	£6,400	£9,100	£9,700
BC (Goal)	£16,470	£15,320	£12,320	£10,940

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Note that Lisa, John, Susan and James self-selected their risk-profile through a simple exercise.

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Do Lisa, John, Susan and James lose anything from this simple communication and hedging strategy?

Not really!

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Look at this certainty equivalent table in terms of utility theory.

	Optimal Strategy	Hedged Strategy		
Investors	CE	CE	WC	BC
Lisa	£12,756	£12,020	£3,900	£16,470
John	£11,643	£11,263	£6,400	£15,320
Susan	£10,627	£10,415	£9,100	£12,320
James	£10,280	£10,169	£9,700	£10,940

Certainty Equivalent (CE): For which certain amount would you exchange your uncertain terminal lump sum.

Now let us go back to the old world of un-hedged utility optimisation.

What can financial miss-understanding cost?

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How much would it cost Lisa if the financial assessment thought she was James?

- Between 5% and 10%
- Between 10% and 15%
- Between 15% and 20%

How much would it cost Lisa if the financial assessment thought she was James?

- Between 5% and 10%
- Between 10% and 15%
- **Between 15% and 20%**

How much would it cost James if the financial assessment thought he was Lisa?

- Between 10% and 20%
- Between 30% and 40%
- Between 70% and 80%

How much would it cost James if the financial assessment thought he was Lisa?

- Between 10% and 20%
- Between 30% and 40%
- **Between 70% and 80%**

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	Lisa Plan	John Plan	Susan Plan	James Plan
Lisa CE	£12,756	£12,326	£11,124	£10,536
John CE	£11,023	£11,643	£11,023	£10,516
Susan CE	£6,156	£9,268	£10,627	£10,437
James CE	£2,388	£5,958	£9,879	£10,280

Certainty Equivalent (CE): For which certain amount would you exchange your uncertain terminal lump sum.

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Now back again to the new Communication and Hedging Strategy...

What does the hedging strategy look like?

The hedging strategy is quite simple:

- Every year[1], put your initial amount (here: £10, 000) scaled by the probability that you do not hit the boundaries (WC and BC) into a risky fund.
- Put the rest into a risk-free fund.

[1]Technically, the strategy requires continuous trading.

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Theorem. The optimal exponential hedge strategy

Assume no inflation, if WC < 10, 000 < BC, then the optimal strategy π^*, i.e., the amount to put into the risky fund, is

$$\pi^*(t) = 10,000 \times P[\, WC < X(T) < BC \mid X(t)\,]$$

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Conclusion

We have developed a pension system which is easy to understand:

- Risk is balanced via selecting a best-case and a worst-case.
- The pension saver is in control and understands the risk he is taking.
- In practice, one can develop an interface where the pension saver picks his risk-profile digitally without the need of meeting a financial adviser.

Research Outlook

Accumulation Phase

- Market timing
- A risk-free inflation fund

Decumulation Phase

- Monthly income, not net worth

In both cases

- A new risk sharing principle

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Questions

Comments

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