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Investment Risk vs Investor Risk

A quick journey through retirement income sufficiency

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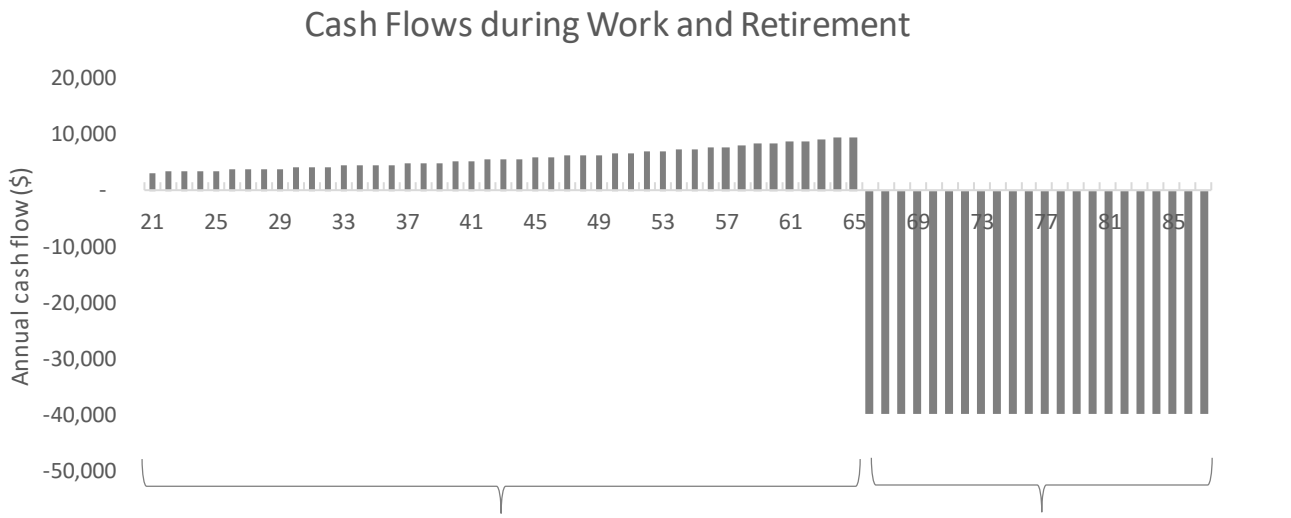
Wealth generation

This is not a rehearsal



Present Value (contributions) = $263,300 ⟺ Present Value (withdrawals) = $876,700*

* Assuming mortality at 87 years…if mortality = 95 years, then PV = $1,195,500

The basic problem:

- Conversion of salary contributions into retirement income
- Implies a real rate of return of 6.72% pa for 30 years of retirement

Assumes a worker who retires on a salary of $120,000 is comfortable with a retirement income of $39,848 pa.

BUT…

US markets (1978-2018)**:

- 60/40 stock/bond portfolio has generated real returns of 6.86% pa
- 70/30 stock/bond portfolio has generated real returns of 7.20% pa

** If retirement date was the GFC historical portfolio returns are: 60/40 = 6.36% pa; 70/30 = 6.58% pa

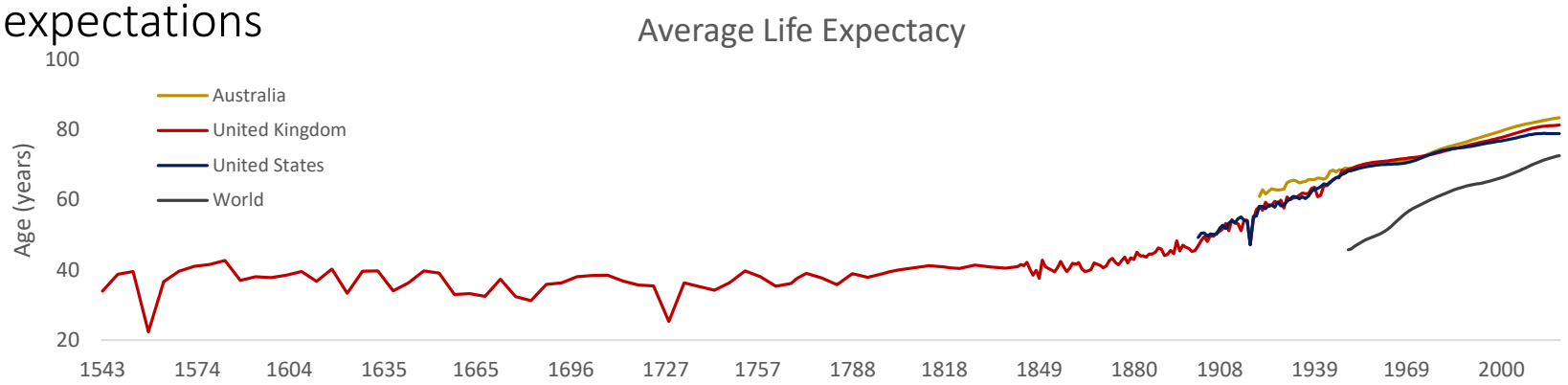
Retirement headwinds

Increasingly difficult to meet expectations

Longevity

Today's global average life expectancy (71 years) is higher than that of any country in 1950*

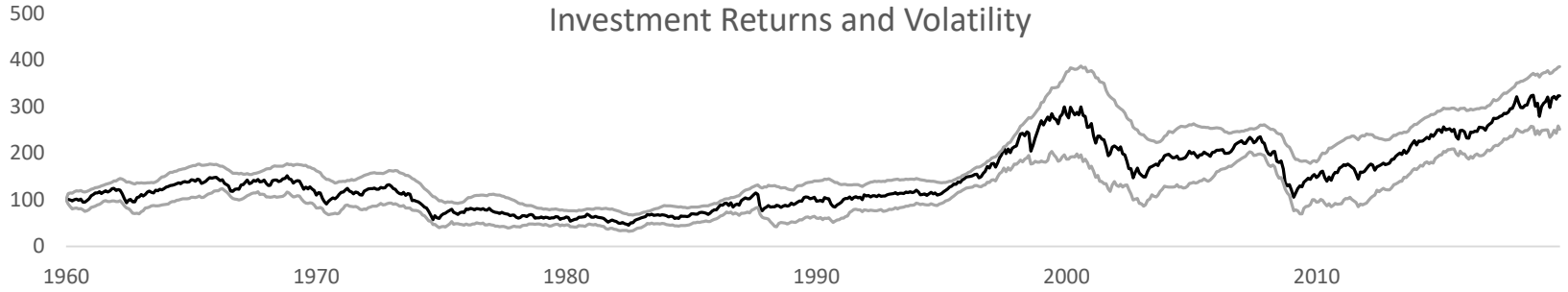
*except a handful in Northern Europe



Source: United Nations Population Division and Human Mortality Database (2015).

Investment

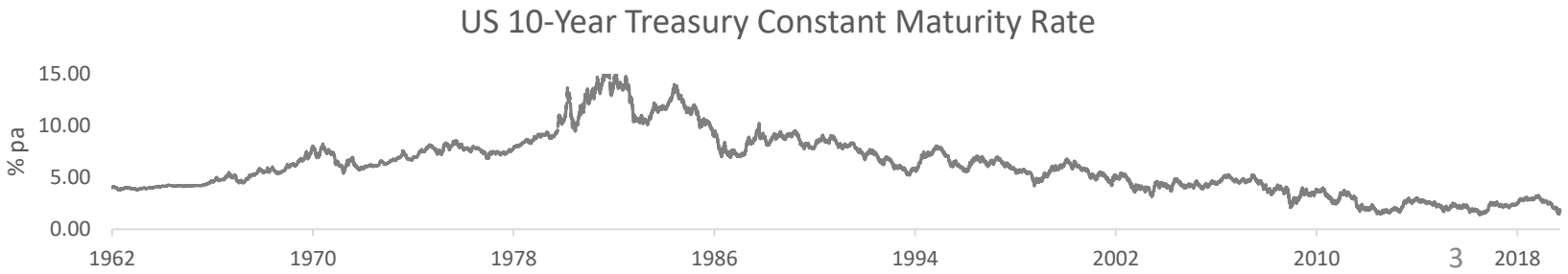
Amplified risk-return ratios imply that good returns are only possible through accepting greater risks



S&P 500 Index adjusted for inflation, bounded by ±2 x standard deviation of returns

Immunisation

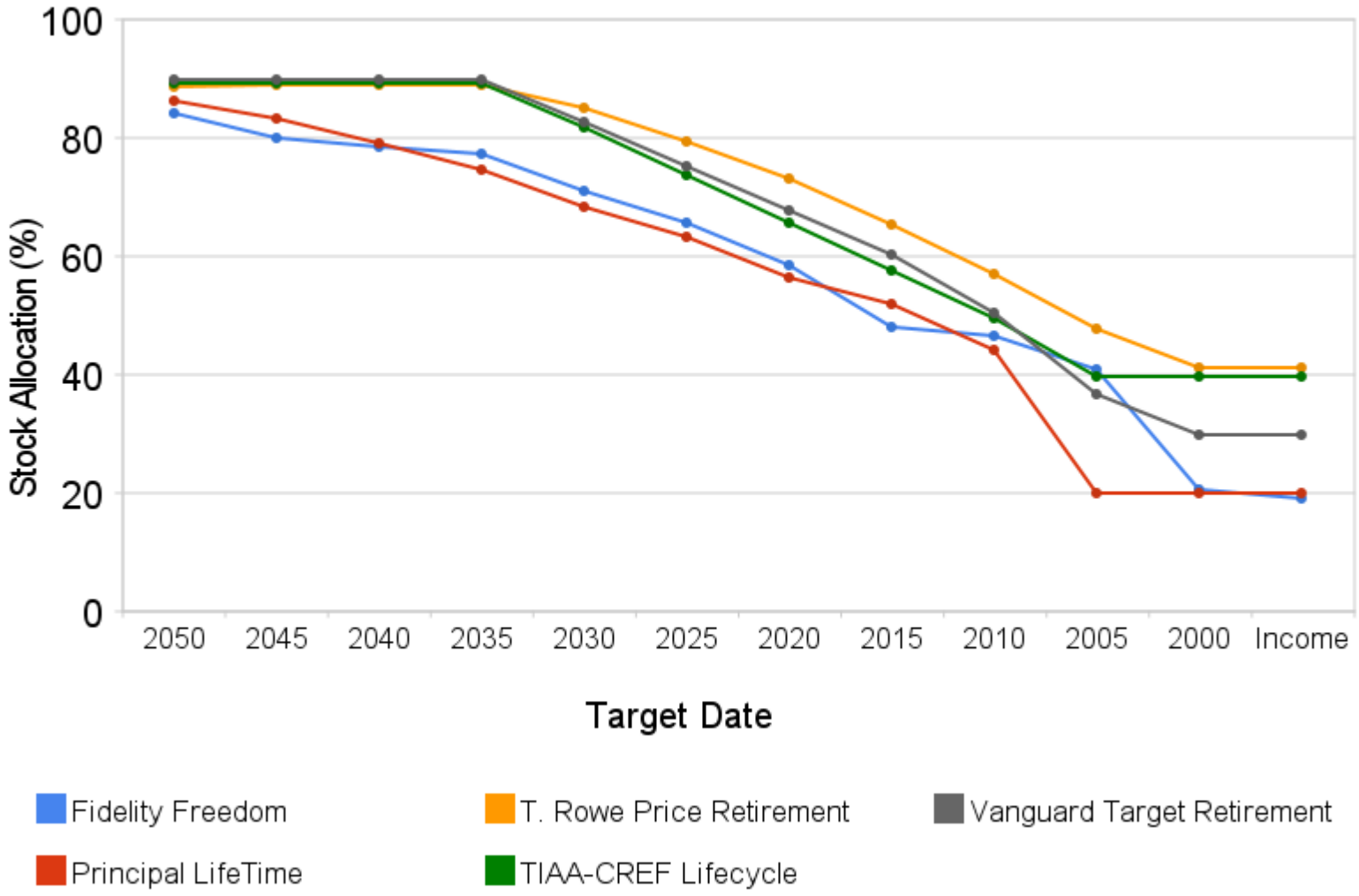
Annuities are more costly today than ever, producing little demand for portfolio immunization products



Source: Board of Governors of the Federal Reserve System.

Glidepaths…designed for the *average* investor

Using Target Date Funds to manage retirement risk



Glidepaths completely ignore retirement income sufficiency

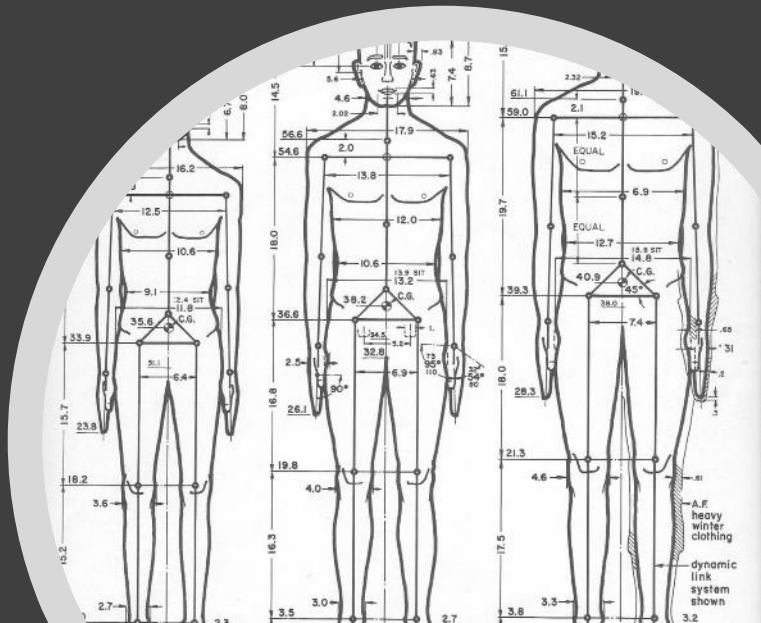
The goal appears to be:

"…amass as much wealth as possible and hope you don't outlive it…"

Wealth paths for the highest, median and lowest wealth at retirement for 70/30 stock/bond TDF reducing to 60/40 ten years prior to retirement date and 30/70 five years prior to retirement date (1972-2018).

The flaw of averages

- Measured physical features from a sample to standardise cockpit dimensions.
- USAF had a serious problem…pilots could not keep control of their planes. Cause? Human error.
- Follow-up analysis of 4,000 pilots to determine a new average
- The mean of 10 physical dimensions to represent the dimensions of the “average pilot” (±15%)



- How many pilots scored average on all 10 physical dimensions?

  Zero

Not a single airman fit the average

“If you’ve designed a cockpit to fit the average pilot then you’ve designed it to fit no-one”

Lt. Gilbert S. Daniels (USAF)

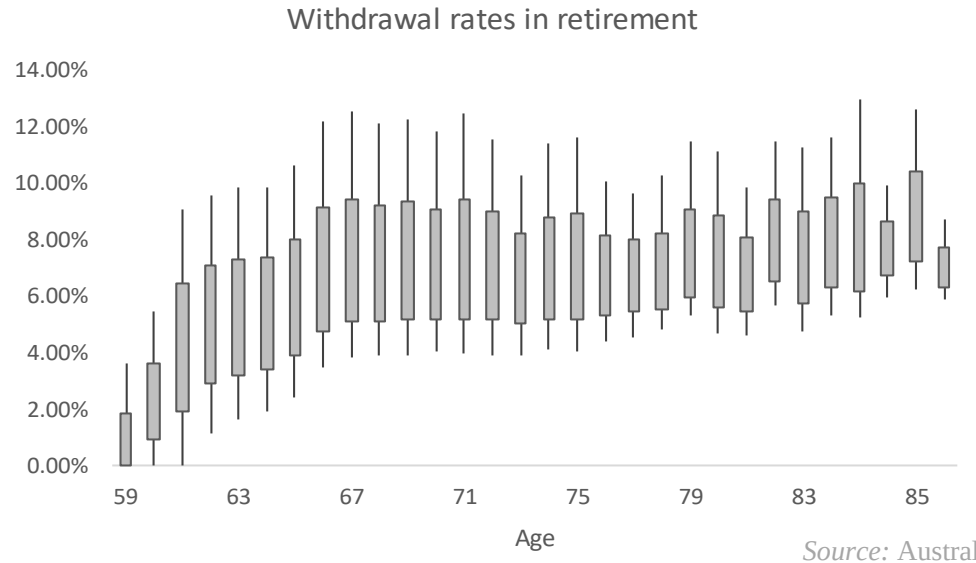
The USAF radically changed their design philosophy:

Don’t fit the individual to the system

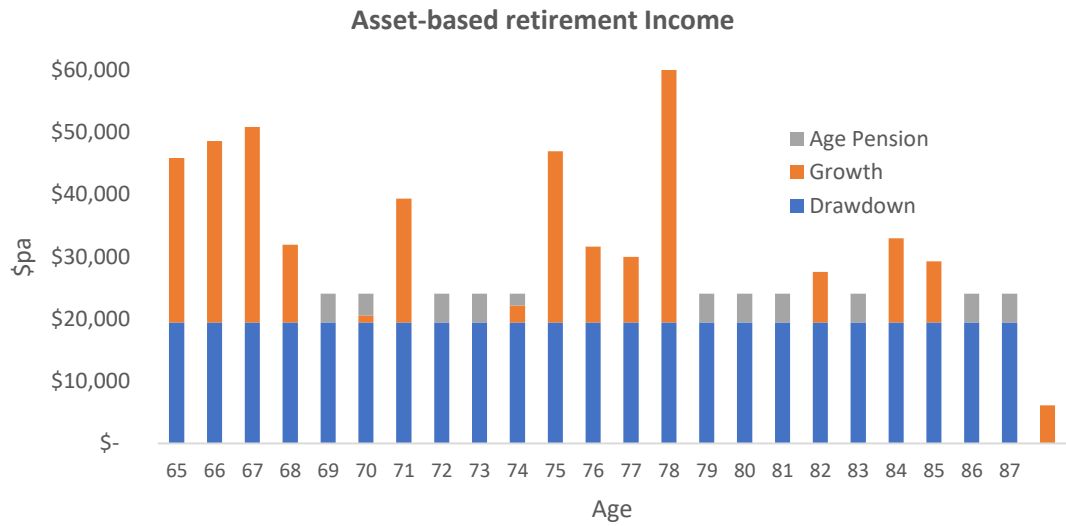
Fit the system to the individual

Retirement income sufficiency

Assumption of constant retirement income is flawed



Source: Australian Taxation Office (2015).



Entropic distance

Kullback and Leibler cross-entropy

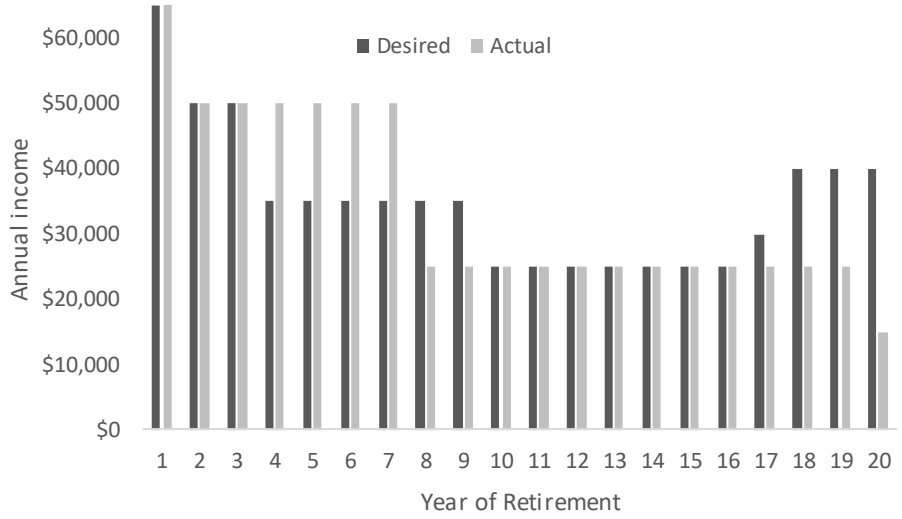
$$KL(P,Q) = \sum_{i=1}^{n} p_i \log \frac{p_i}{q_i}$$

p and q denote the probability densities of P and Q

Entropy is not simply *a* measure of uncertainty;

It is *the* measure of uncertainty.

Income Sufficiency: An example



Year		Desired	q_i	Actual	p_i	$KL(P,Q)$
	1	$65,000	9.29%	$85,000	12.14%	0.033
	2	$50,000	7.14%	$50,000	7.14%	-
	3	$50,000	7.14%	$50,000	7.14%	-
	4	$35,000	5.00%	$50,000	7.14%	0.025
	5	$35,000	5.00%	$50,000	7.14%	0.025
	6	$35,000	5.00%	$50,000	7.14%	0.025
	7	$35,000	5.00%	$50,000	7.14%	0.025
	8	$35,000	5.00%	$25,000	3.57%	- 0.012
	9	$35,000	5.00%	$25,000	3.57%	- 0.012
	10	$25,000	3.57%	$25,000	3.57%	-
	11	$25,000	3.57%	$25,000	3.57%	-
	12	$25,000	3.57%	$25,000	3.57%	-
	13	$25,000	3.57%	$25,000	3.57%	-
	14	$25,000	3.57%	$25,000	3.57%	-
	15	$25,000	3.57%	$25,000	3.57%	-
	16	$25,000	3.57%	$25,000	3.57%	-
	17	$30,000	4.29%	$25,000	3.57%	- 0.007
	18	$40,000	5.71%	$25,000	3.57%	- 0.017
	19	$40,000	5.71%	$25,000	3.57%	- 0.017
	20	$40,000	5.71%	$15,000	2.14%	- 0.021
Total		**$700,000**	**100%**	**$700,000**	**100%**	**0.049**

Glidepath topography

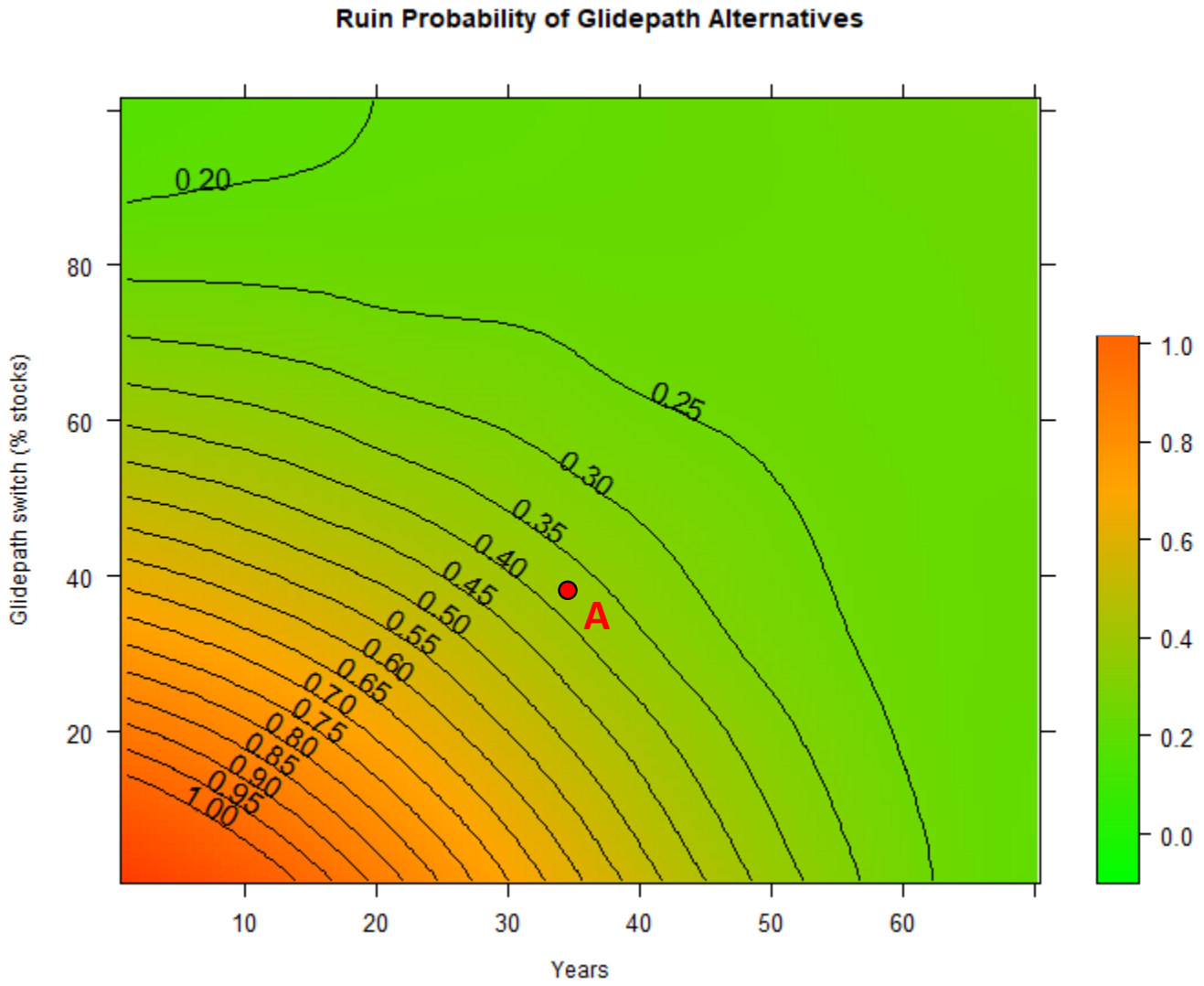
The “average” investor

Work 45 years
Retire 25 years

Contribution 9% pa
Starting salary $50,000 pa
Salary growth 1% pa (real)
Initial allocation 80/20
Retirement income $39,000*

* ½ of final salary

Stock returns 6.05% pa real
Stock volatility 13.1% pa
Bond returns 1.99% pa
Bond volatility 4% pa
Cor(stocks, bonds) 30%



Forced early retirement

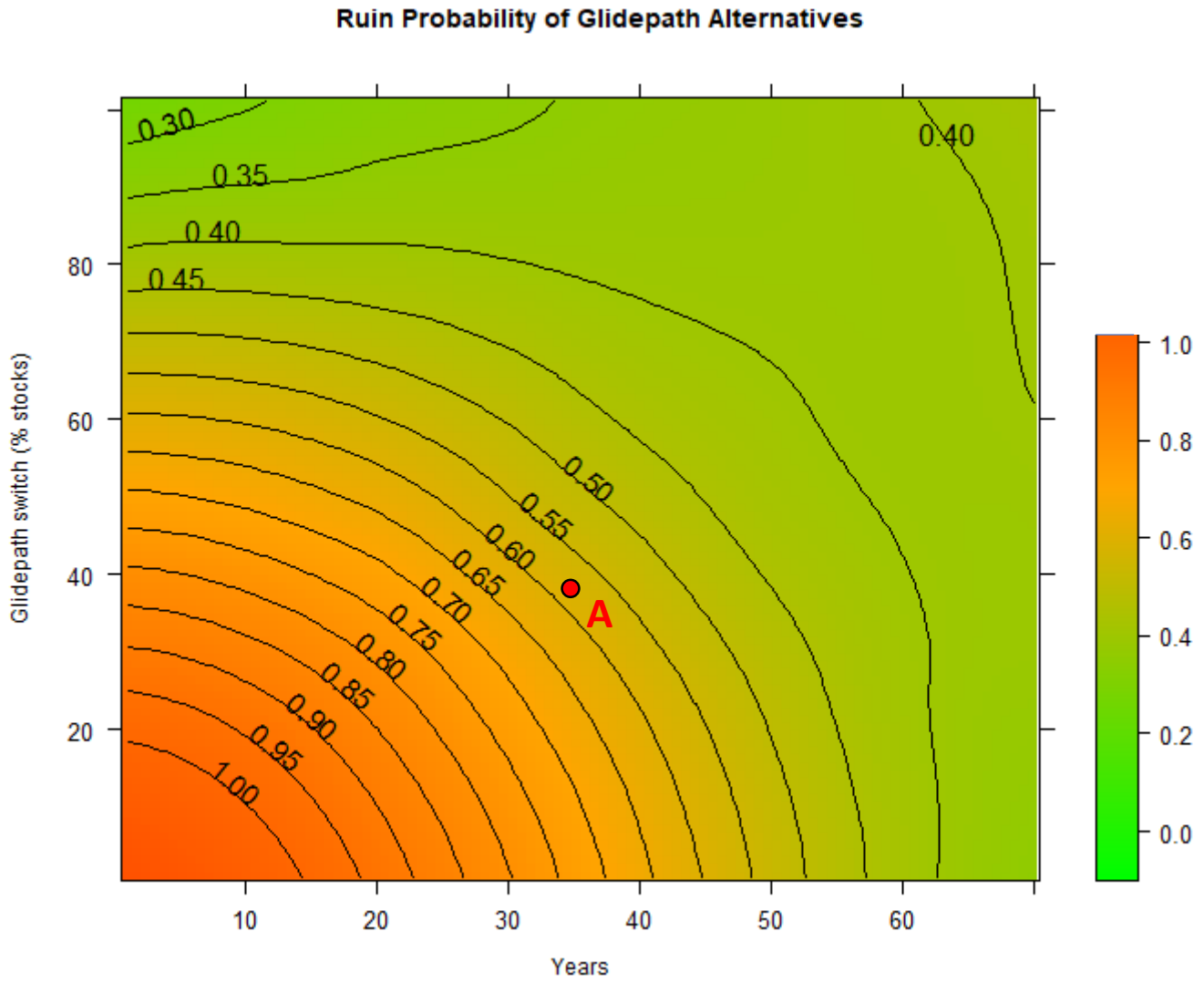
Three years too early

Work 42 years
Retire 28 years

Contribution 9% pa
Starting salary $50,000 pa
Salary growth 1% pa (real)
Initial allocation 80/20
Retirement income $38,000*

* ½ of final salary

Stock returns 6.05% pa real
Stock volatility 13.1% pa
Bond returns 1.99% pa
Bond volatility 4% pa
Cor(stocks, bonds) 30%



Work for longer

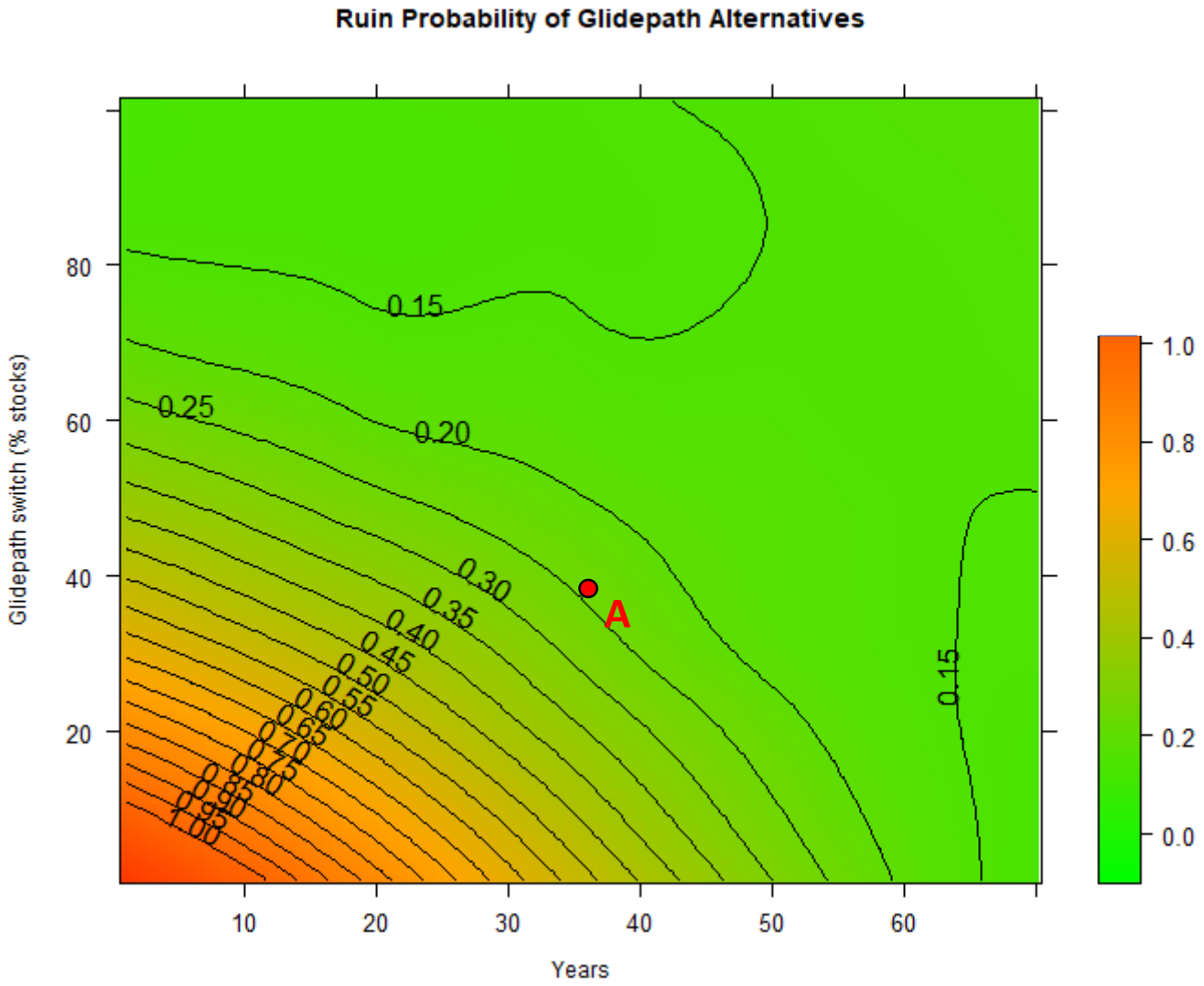
Three-year delay

Work 48 years
Retire 22 years

Contribution 9% pa
Starting salary $50,000 pa
Salary growth 1% pa (real)
Initial allocation 80/20
Retirement income $40,300*

* ½ of final salary

Stock returns 6.05% pa real
Stock volatility 13.1% pa
Bond returns 1.99% pa
Bond volatility 4% pa
Cor(stocks, bonds) 30%



Career change

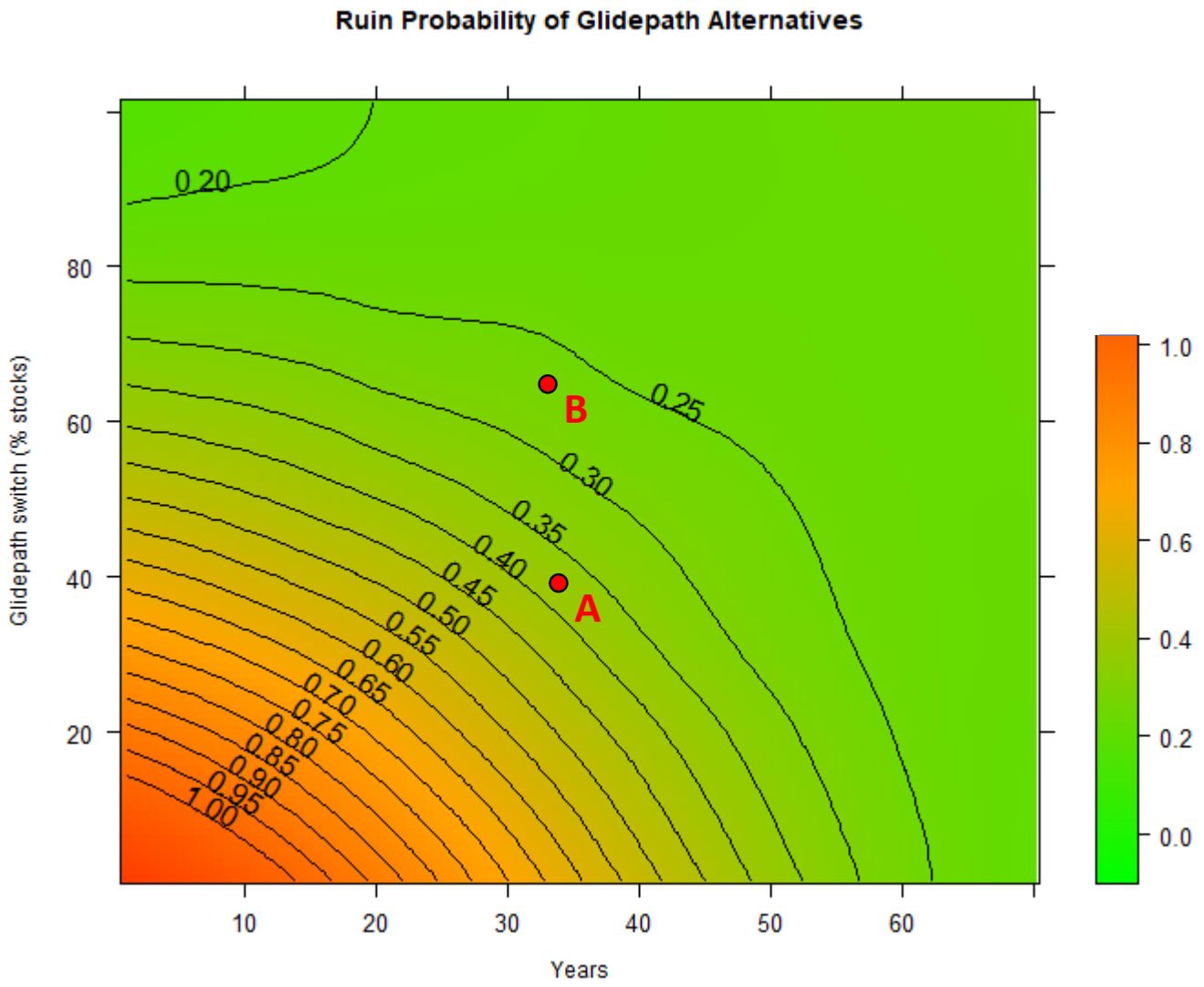
Glidepaths assume salary grows slowly

Work 45 years
Retire 25 years

Contribution 9% pa
Starting salary $50,000 pa
Salary growth 1% pa (real)
Initial allocation 80/20
Retirement income $43,000*

* ASFA comfortable (single)

Stock returns 6.05% pa real
Stock volatility 13.1% pa
Bond returns 1.99% pa
Bond volatility 4% pa
Cor(stocks, bonds) 30%



Career change

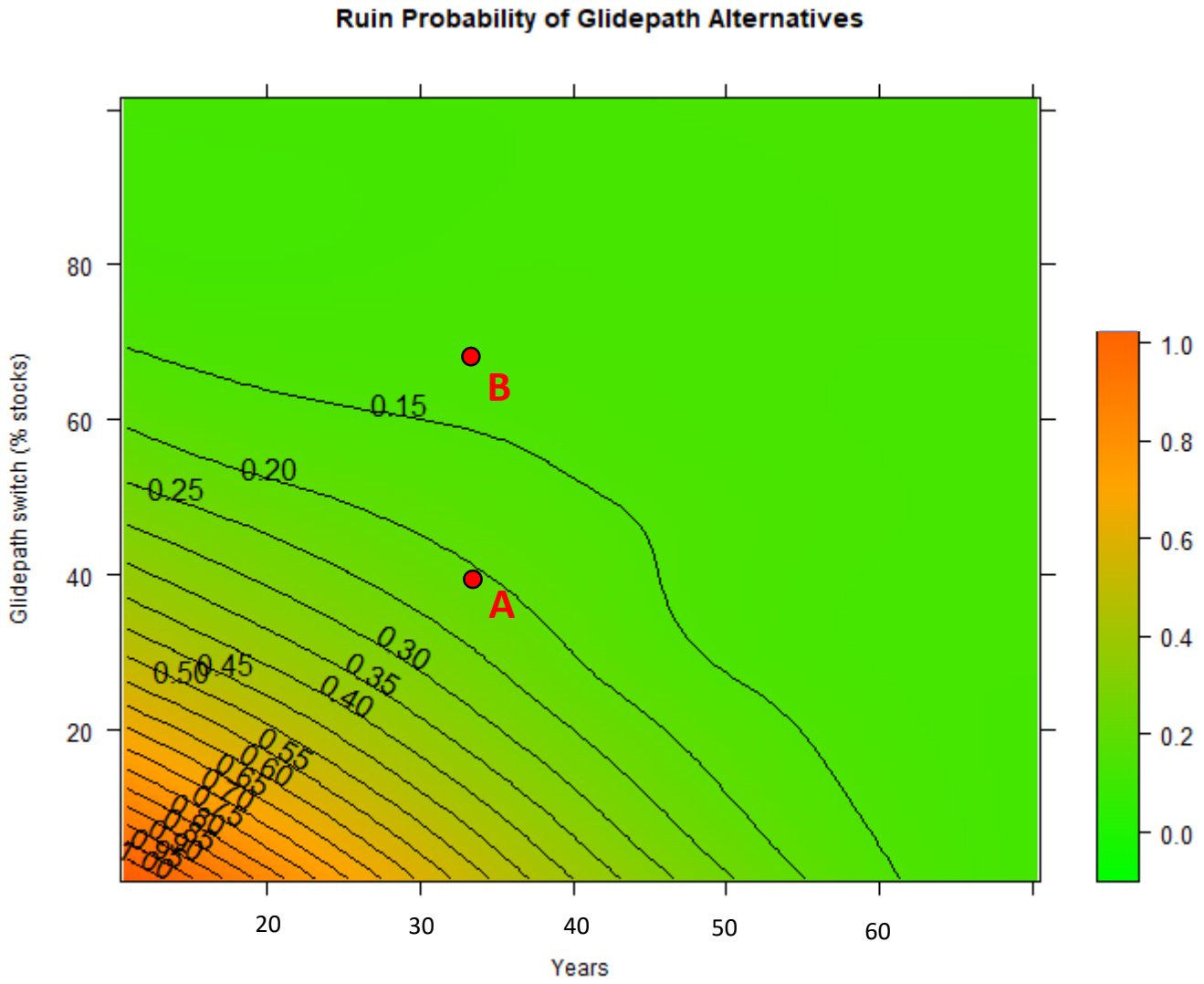
Salary doubles after 10 years

Work 45 years
Retire 25 years

Contribution 9% pa
Starting salary $50,000 pa
Salary growth 1% pa (real)
Initial allocation 80/20
Retirement income $61,000*

* ASFA comfortable (single)

Stock returns 6.05% pa real
Stock volatility 13.1% pa
Bond returns 1.99% pa
Bond volatility 4% pa
Cor(stocks, bonds) 30%



Dual risk approach

Mainsail Portfolio (for protection)

Safety-first, insurance-like sub-portfolio to maximize the probability of meeting investors' retirement liabilities - a retirement liability hedge.

Spinnaker Portfolio (for growth)

A complementary but separate growth-focused sub-portfolio aiming to maximize performance beyond retirement income security.

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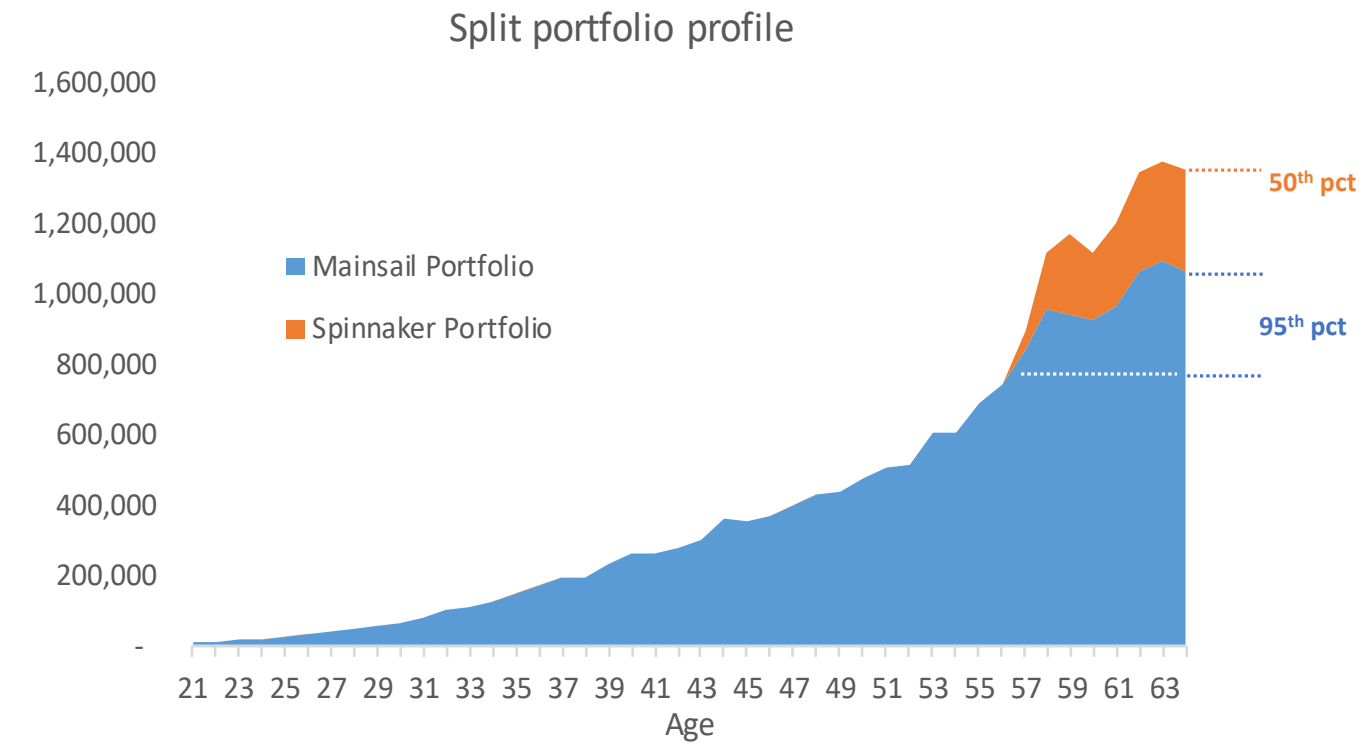
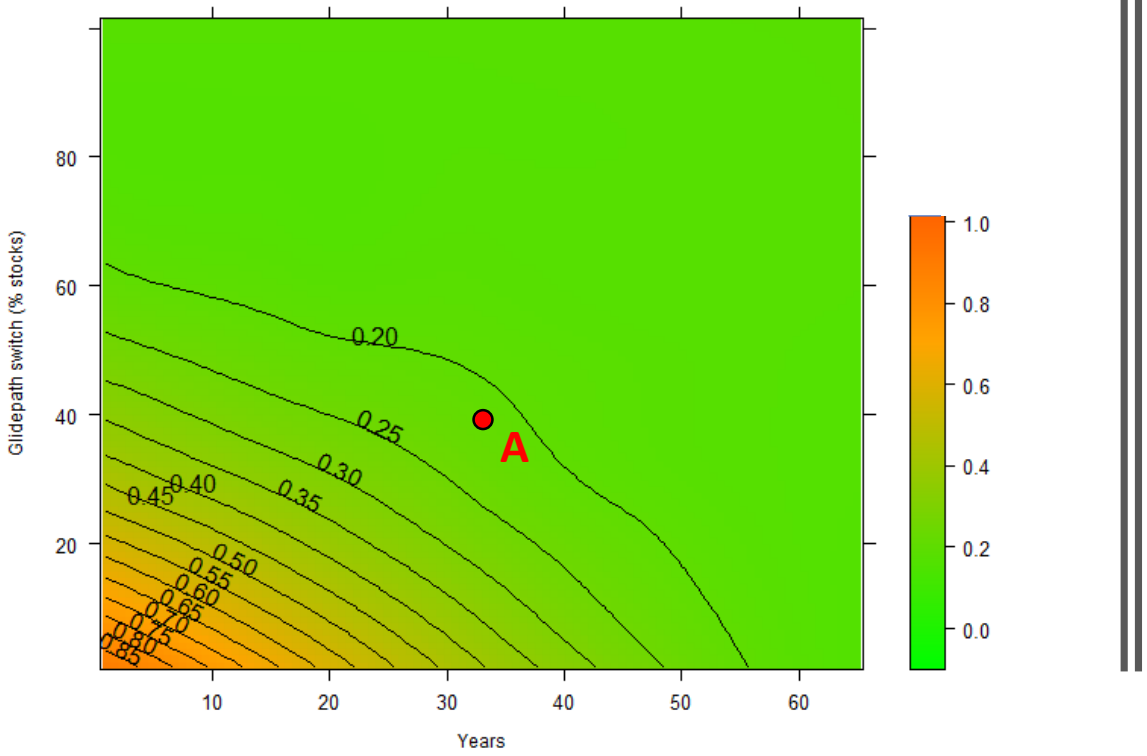
A dual risk approach?



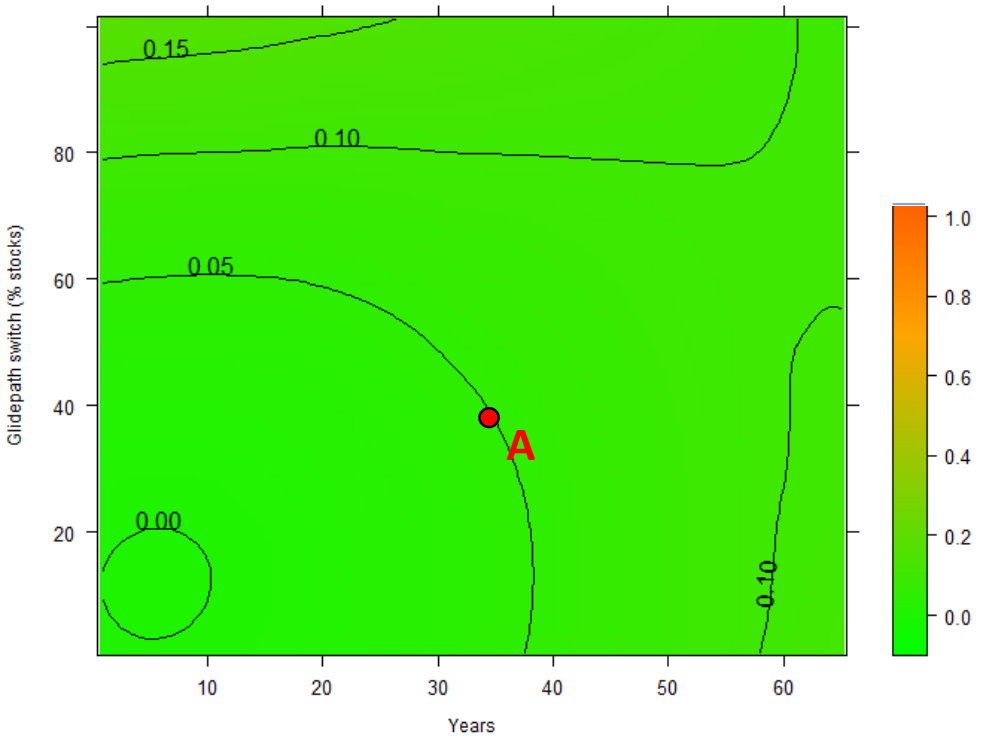
Scenario Analysis

"Stocks are stories, bonds are mathematics"

Bond yields remain at 1% pa (real)



Bond yields jump to 4% pa (real)



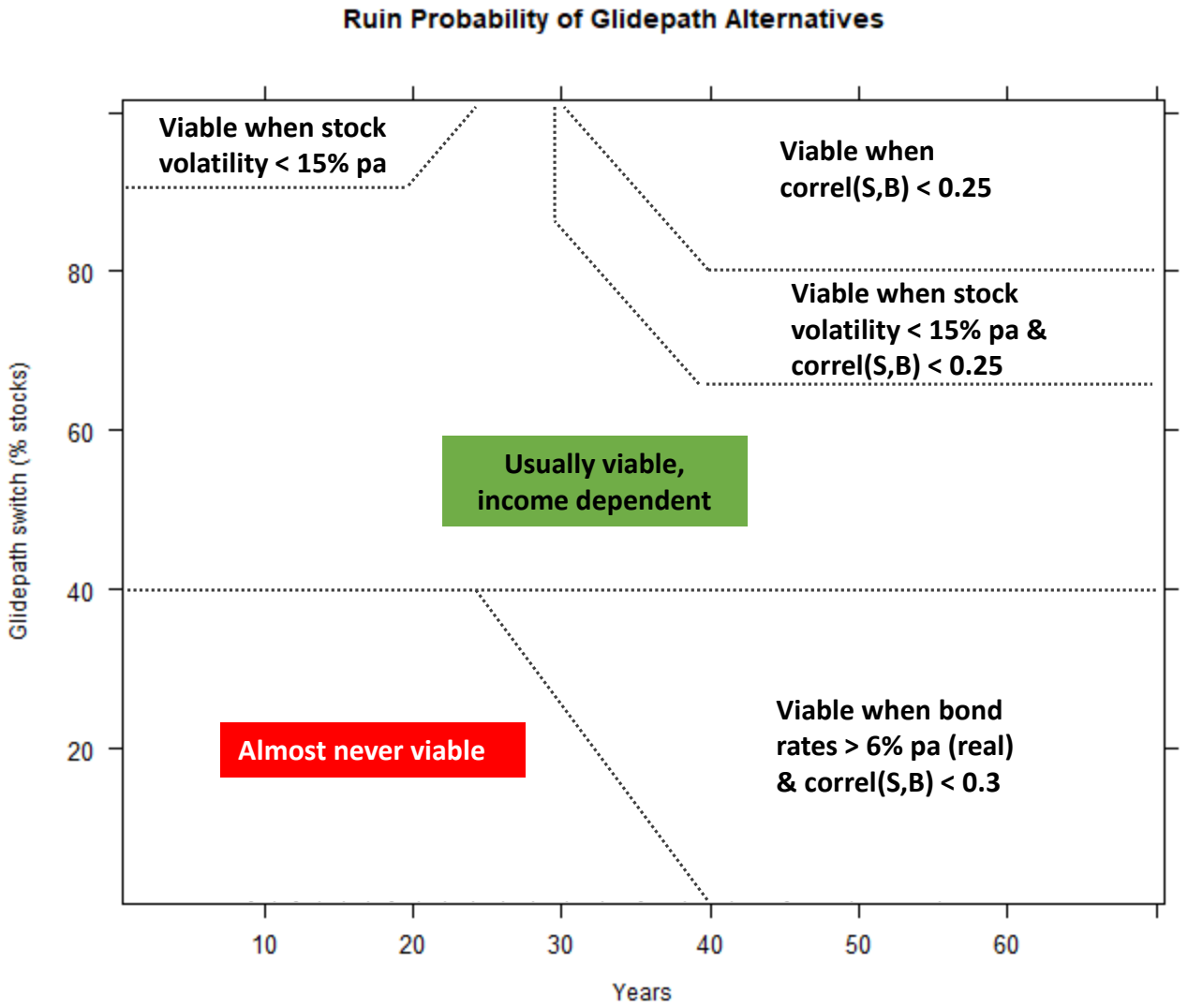
Topography outcomes

Dependent on longevity, markets, & desired income

Glidepaths can be adjusted to fit every “average” investor.

So long as we account for:

- Tendency to underspend
- Tendency to overestimate longevity
- Retirement income variability
- Updating glidepath decision points as markets shift
- Updating glidepath as personal circumstances change
- Impact of other diversifying assets



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Questions?

Thank you