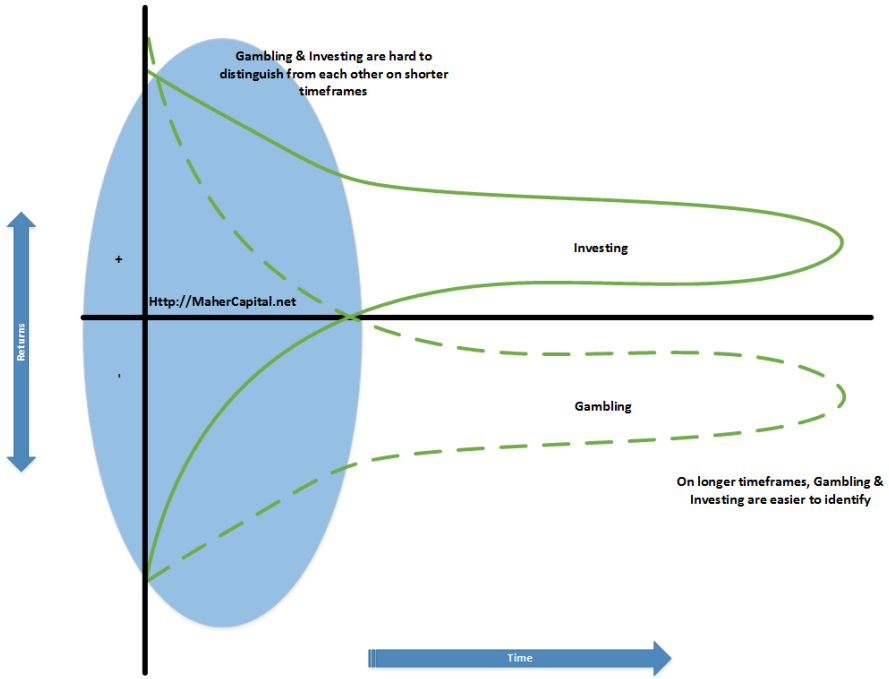
"Gambling with Time"
The importance of time and volatility in portfolio construction.

Richard (Jerry) Haworth
Co-founder, CEO & Head of Investments
36 South Capital Advisors LLP

What is gambling anyway?

Gambling vs investment



Source: Maher Capital website [online]. Available at: <http://mahercapital.net> [Accessed on 20th October 2013].

Why are we gambling with time?

Are we gambling with time?

YES!!!!
BECAUSE WE IGNORE THE ROLE OF VOLATILITY AND TIME IN PORTFOLIO CONSTRUCTION !!!!!!

Why are we gambling with time?

Goal of portfolio construction:

To preserve real wealth with minimal chance of ruin.

Why are we gambling with time?

The odds are against us:

Family wealth's lifespan?
Banks longest lifespan?
Financial system's lifespan?

Entropy is the natural end goal.

Denomination	Estimated Life Span*
$1	5.9 years
$5	4.9 years
$10	4.2 years
$20	7.7 years
$50	3.7 years
$100	15.0 years

Source: Pittman, S. 2010. "Volatility Drag: What is it? What's it doing to my wealth? And how much do I curb it? [online] Available at: <http://seekingalpha.com/instablog/659612-sampittman/73533-volatility-drag-what-is-it-what-s-it-doing-to-my-wealth-and-how-do-i-curb-it> [Accessed on 20th Oct 2013].

Why are we gambling with time?

Life is a gamble.

We need to store "value" for the future, to consume and to trade. i.e. real goods.

Storage is a gamble. i.e. bad odds.

So we use money as a proxy.

Paper money is a proxy gamble. The Fed can print the stuff.

Then they take up to 50% in taxes! Then…

Why are we gambling with time?

But worst of all we then use Mean Variance analysis and its bastard children like Modern Portfolio Theory to manage what is left.

Why so harsh?

These systems MASSIVELY underestimate real risk.

What is wrong with MPT?

It uses arithmetic returns.
It assumes ergodicity.
It assumes normal distribution for all assets.
It assumes the edge and odds are the same, i.e. no alpha.
It assumes all risk is encapsulated by volatility.
It assumes constant volatility.
It assumes constant correlation.

Would a bookmaker use MPT?

Refutation of MPT and variants

It uses arithmetic returns.
It assumes ergodicity, i.e. ensemble vs time.
It assumes normal distribution for all assets.
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It assumes constant volatility.
It assumes constant correlation.

Why are we gambling with time?

Solution: maximise geometric returns not arithmetical returns.

Geometric Return =
Arithmetic Return - 0.5*Variance

Take time and "non-constant" volatility/correlation and Black Swans into account.

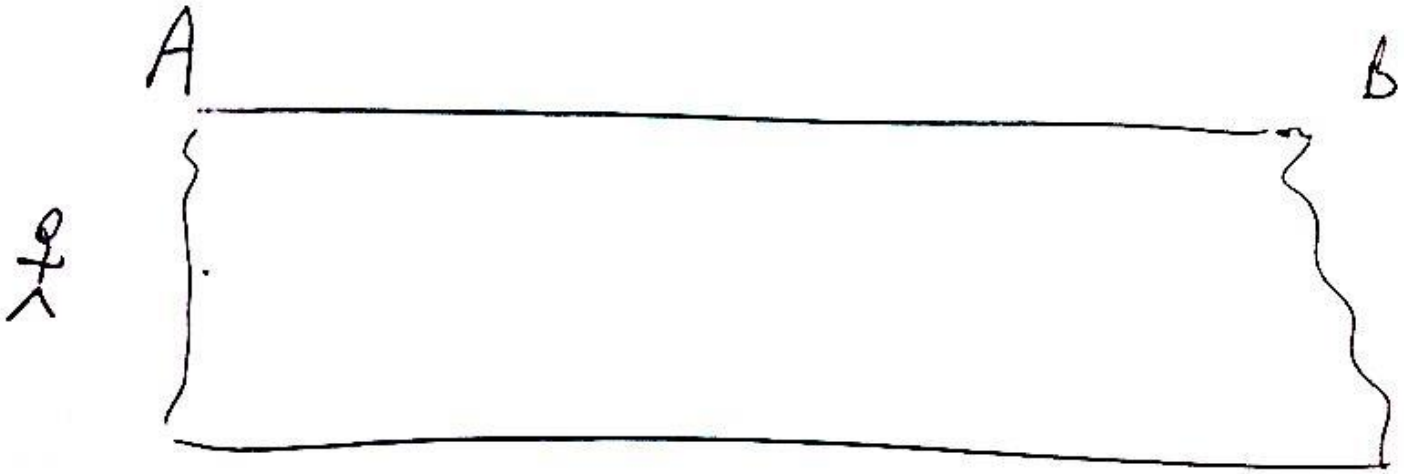
Why are we gambling with time?

Thinking geometrically.

- the land-cruiser problem
- the "river of life"
- the coin toss

Why are we gambling with time?

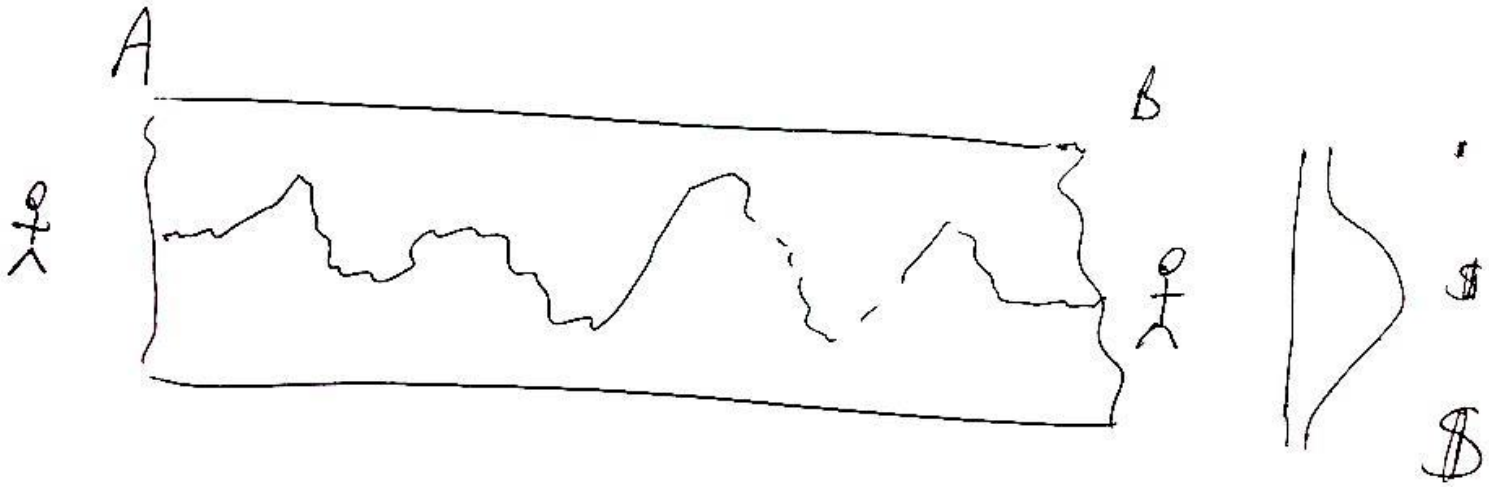
The River of Life



Source: Richard (Jerry) Haworth, private collection.

Why are we gambling with time?

The River of Life



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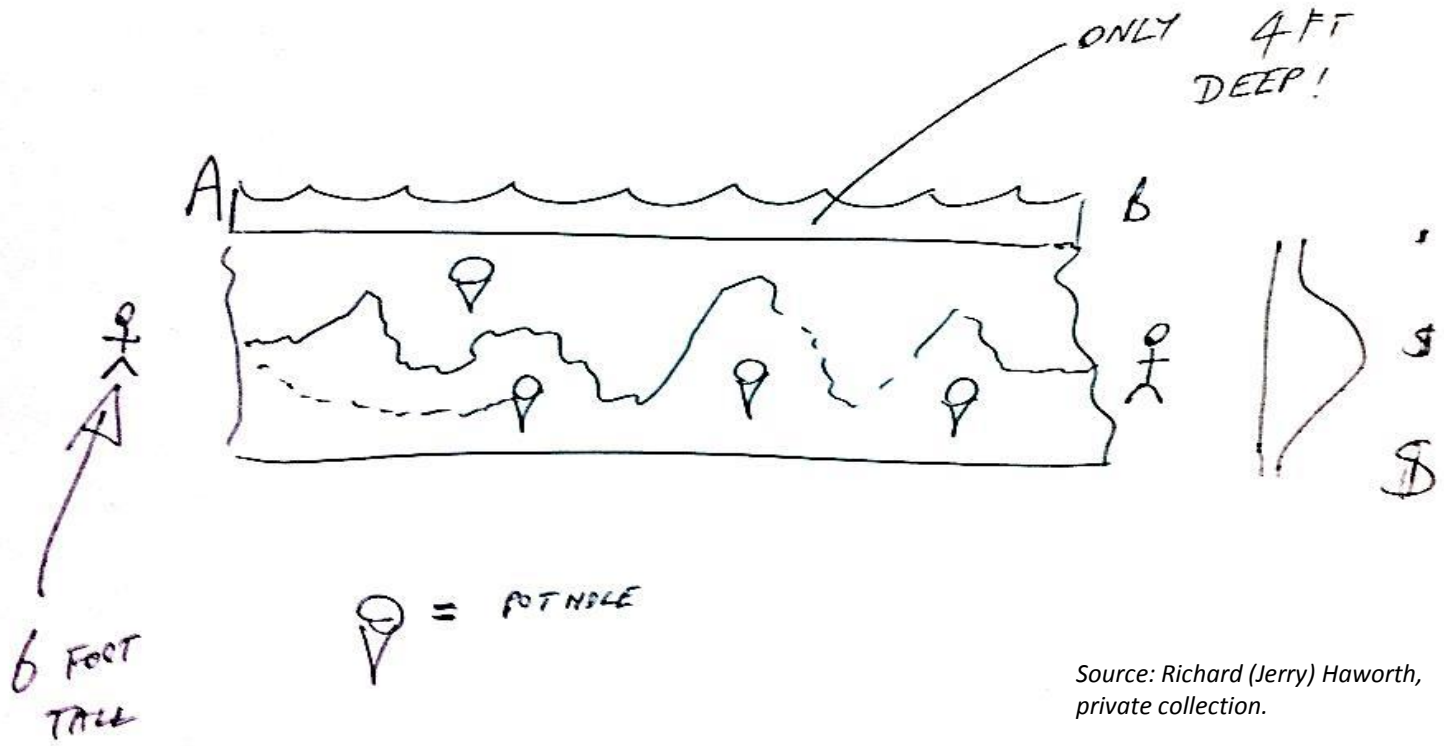
The River of Life



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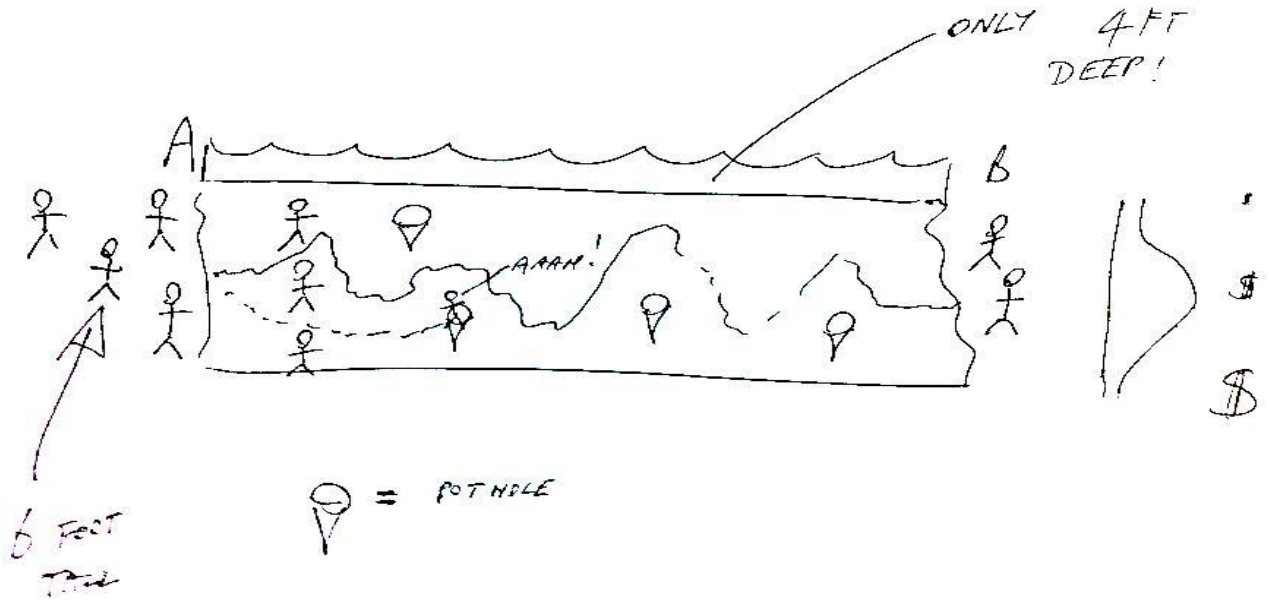
The River of Life



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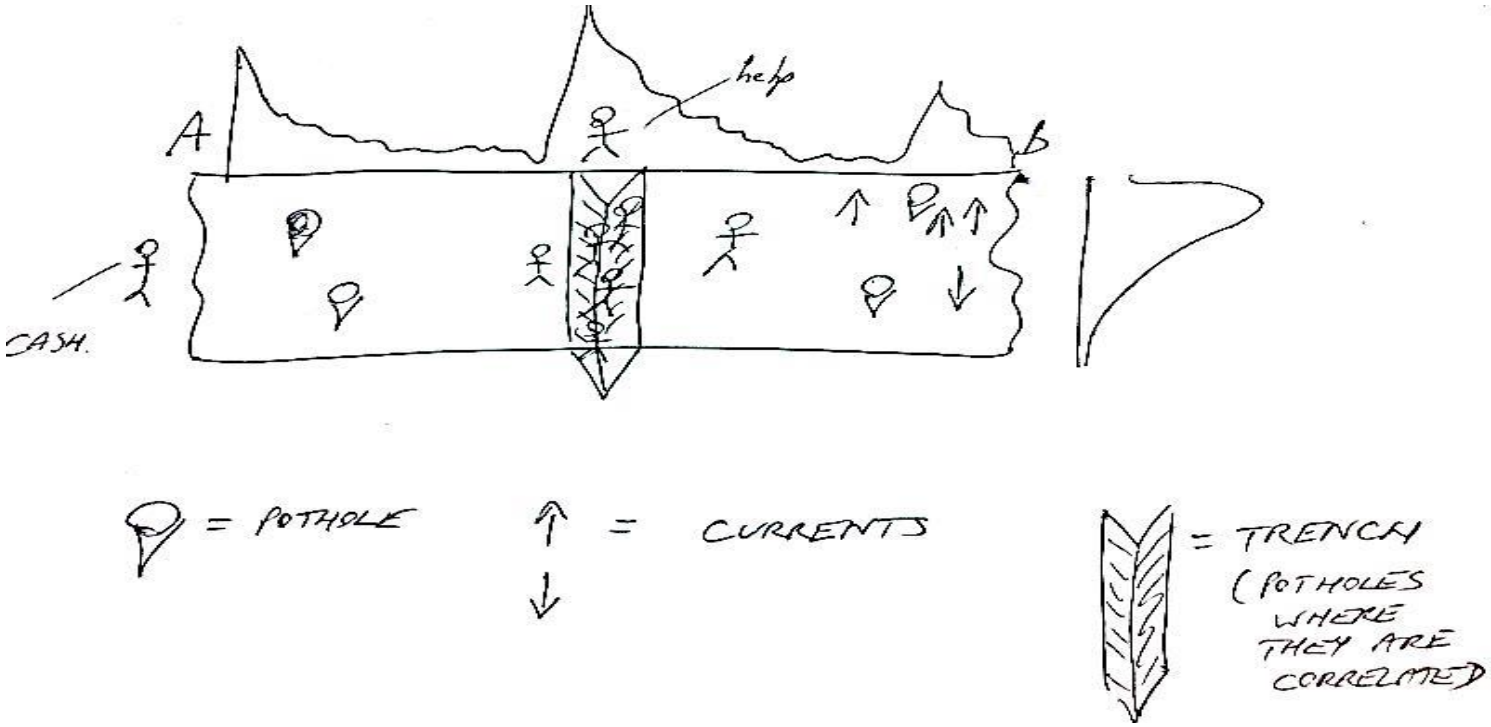
The River of Life



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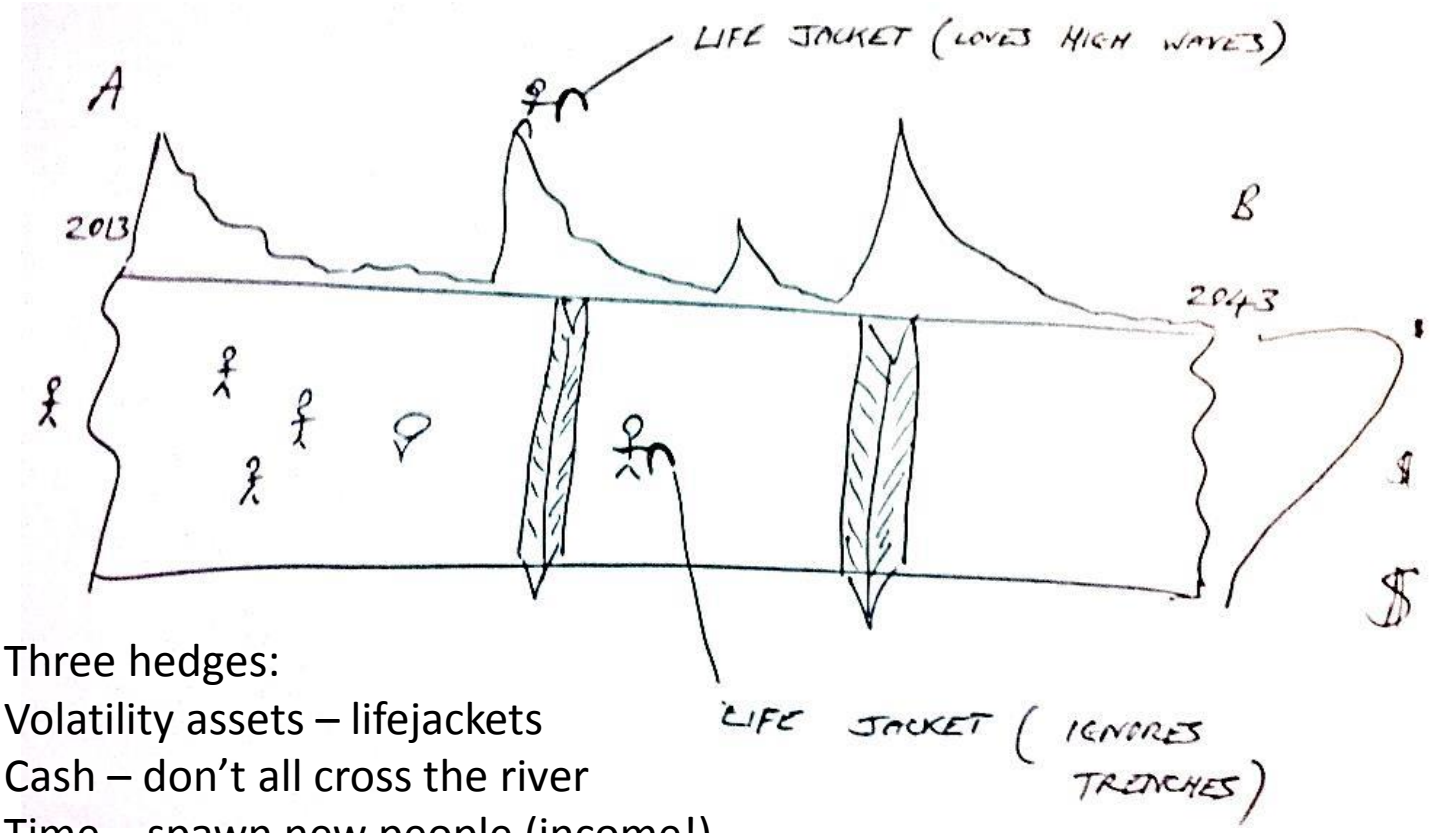
Why are we gambling with time?

The River of Life

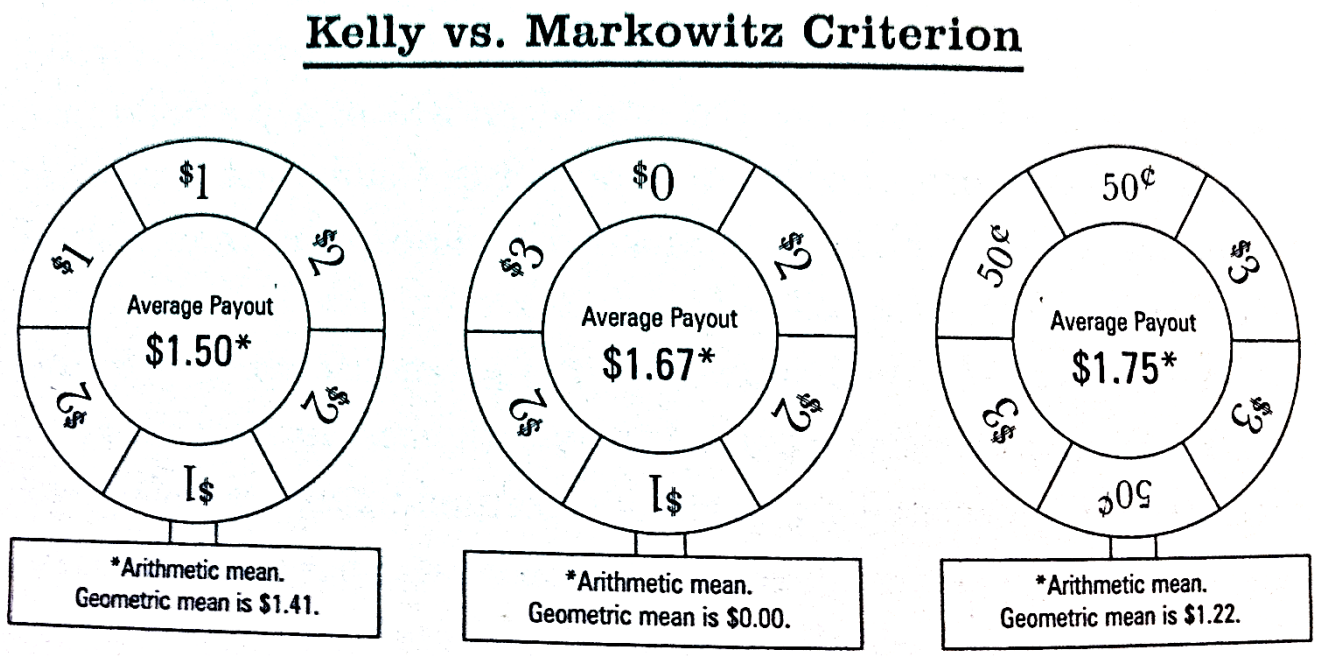


Three hedges:
Volatility assets – lifejackets
Cash – don't all cross the river
Time – spawn new people (income!)

Source: Richard (Jerry) Haworth, private collection.

Why are we gambling with time?

Arithmetic vs geometric mean



Source: Poundstone, W. 2005. "Fortune's Formula: The Untold Story of the Scientific Betting System that Beat the Casinos and Wall Street", Hill and Wang, New York.

Initial conclusions

Thinking with a MPT hat leads us to seriously mis-estimate real risk by ignoring the role of time and volatility.

Must think geometrically.

Why are we gambling with time?

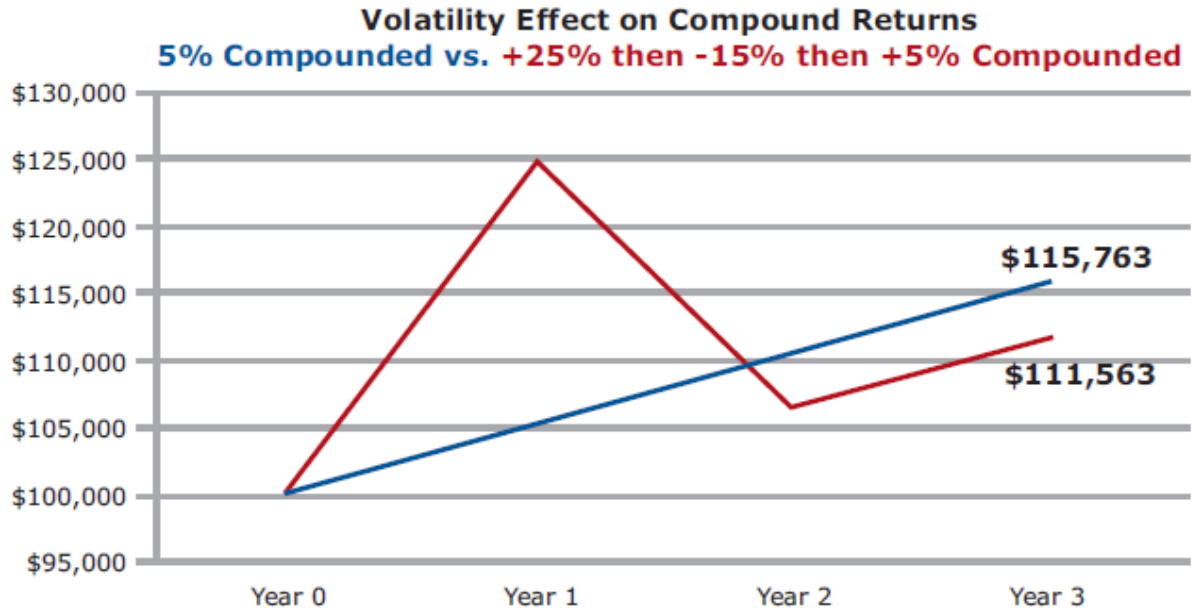
Maximising geometrical returns by taking…

volatility and Black Swans

…into account.

Volatility and time

Chart 1: Compound Returns are Lower Due to Volatility



Source: Butler|Philbrick & Associates

Volatility and time

Table 1: Volatility Effect on Average and Compound Returns

		Case A	Case B	Case C	Case D	Case E	Case F
Year 1		5%	4%	9%	15%	25%	30%
Year 2		5%	5%	5%	-10%	-15%	-25%
Year 3		5%	6%	1%	10%	5%	10%
Simple Average Return		5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Compound Average Return		5.0%	5.0%	4.9%	4.4%	3.7%	2.4%

Source: GestaltU, 2010. "Volatility Gremlins" [online] Available at: <http://gestaltu.com/author/gestaltu/page/16. [Accessed on 20th October 2013] .

Volatility and time

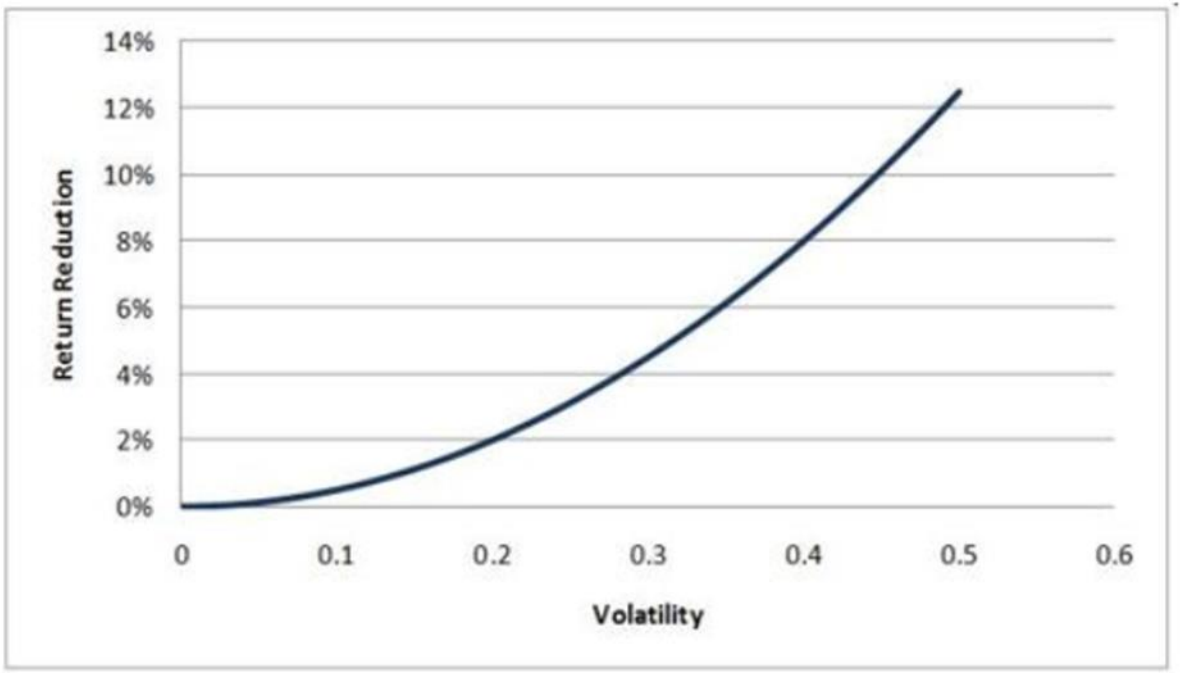
Portfolio A
Beginning Value: $1,000,000
Average Return: 8%
Years: 16 years
Volatility: +30%, -14% (every other year)
Compound Return: 5.74%
Ending Balance: $2,440,813

Portfolio B
Beginning Value: $1,000,000
Average Return: 8%
Years: 16 years
Volatility: +20%, -4% (every other year)
Compound Return: 7.33%
Ending Balance: $3,101,843

$661,030 Difference

Source: 36 South Capital Advisors LLP.

Volatility drag



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Volatility and time

How to minimise its effect on compound growth?

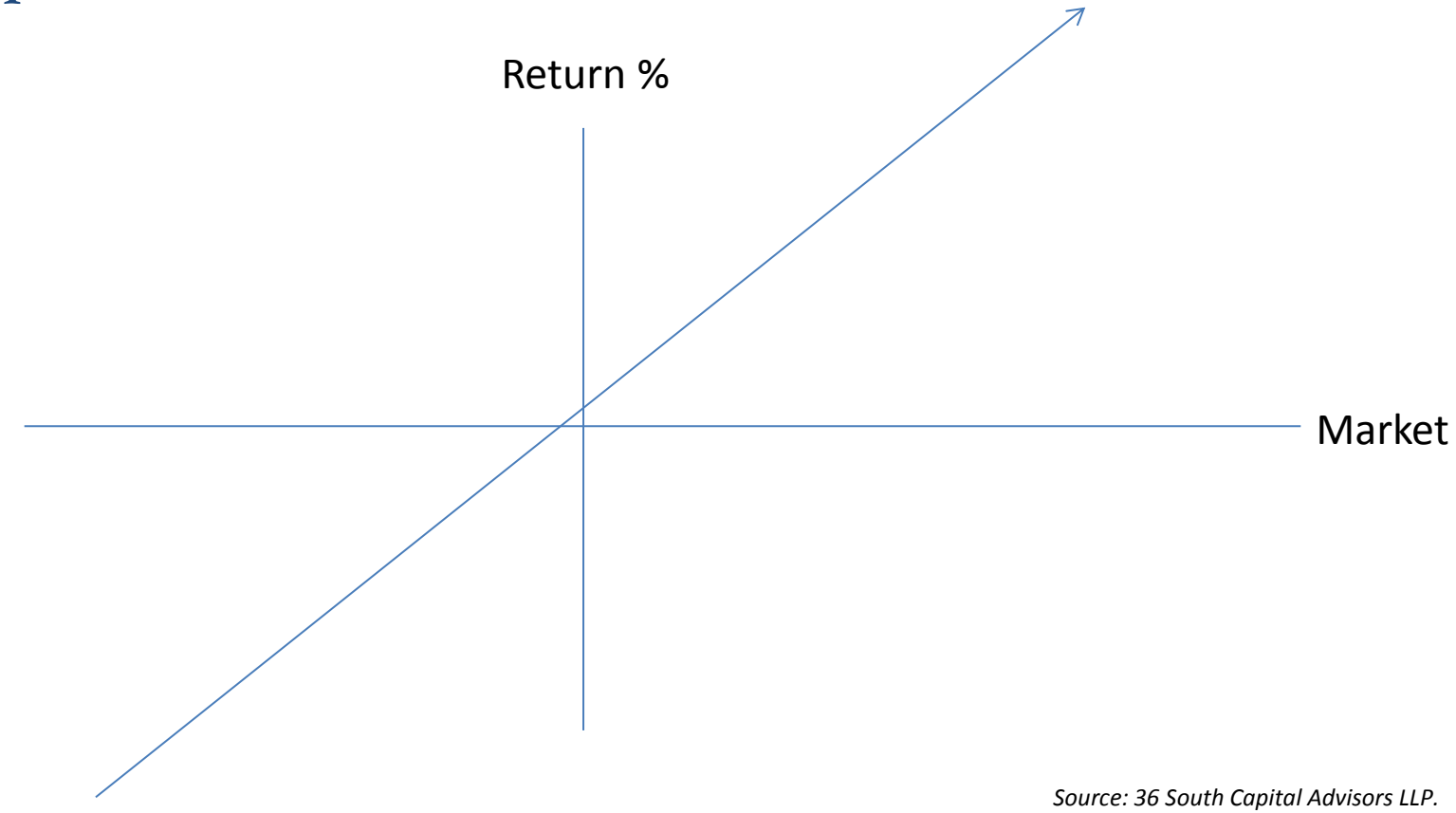
- Put lower volatility assets in the portfolio.
- Put assets in the portfolio which benefit from volatility.

Also put in:

- assets with a higher edge/odds or alpha,
- assets with an asymmetrical pay-off,
- assets with asymmetrical volatility profile.

Volatility and time

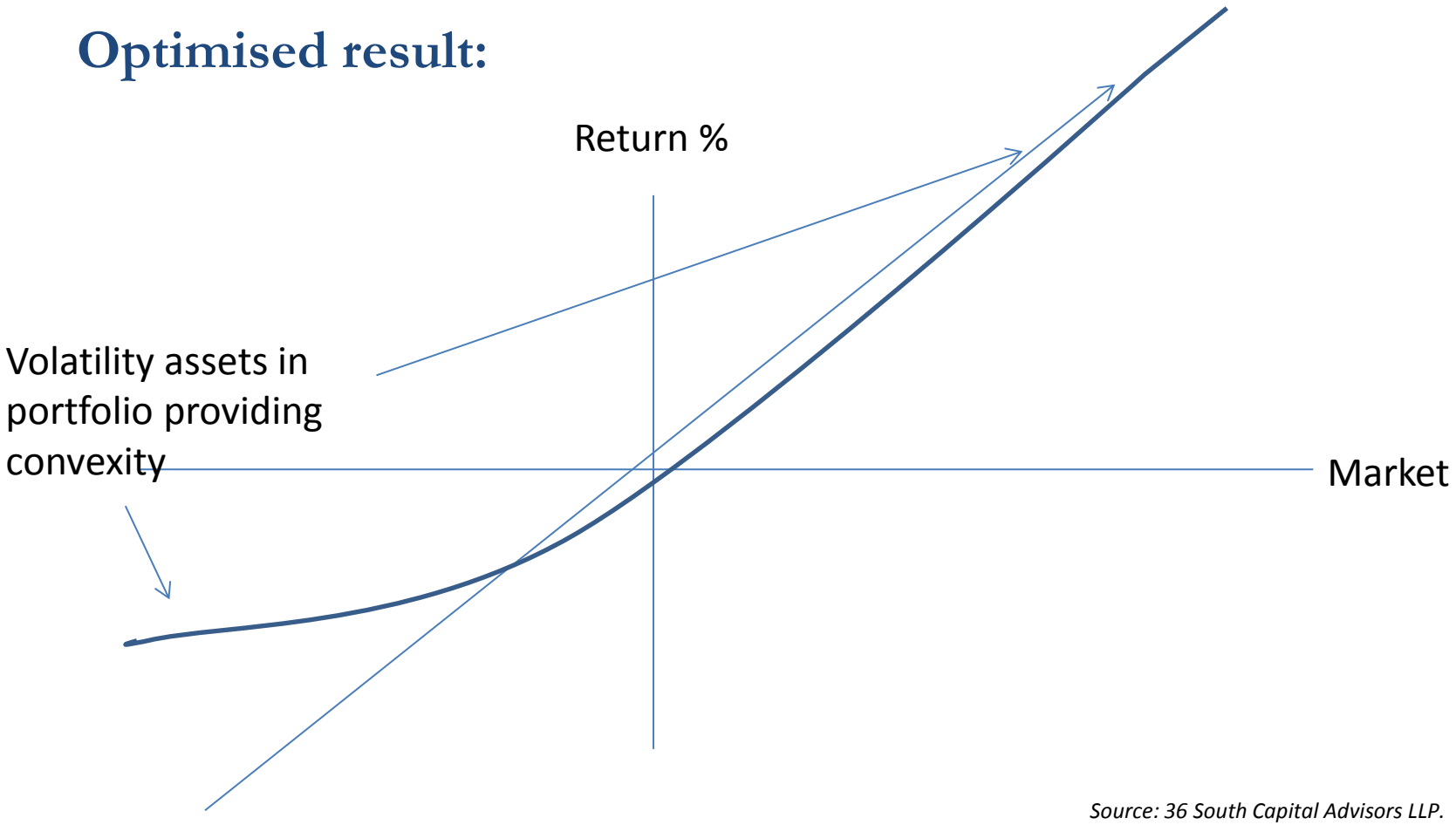
Optimised result:



Source: 36 South Capital Advisors LLP.

Volatility and time

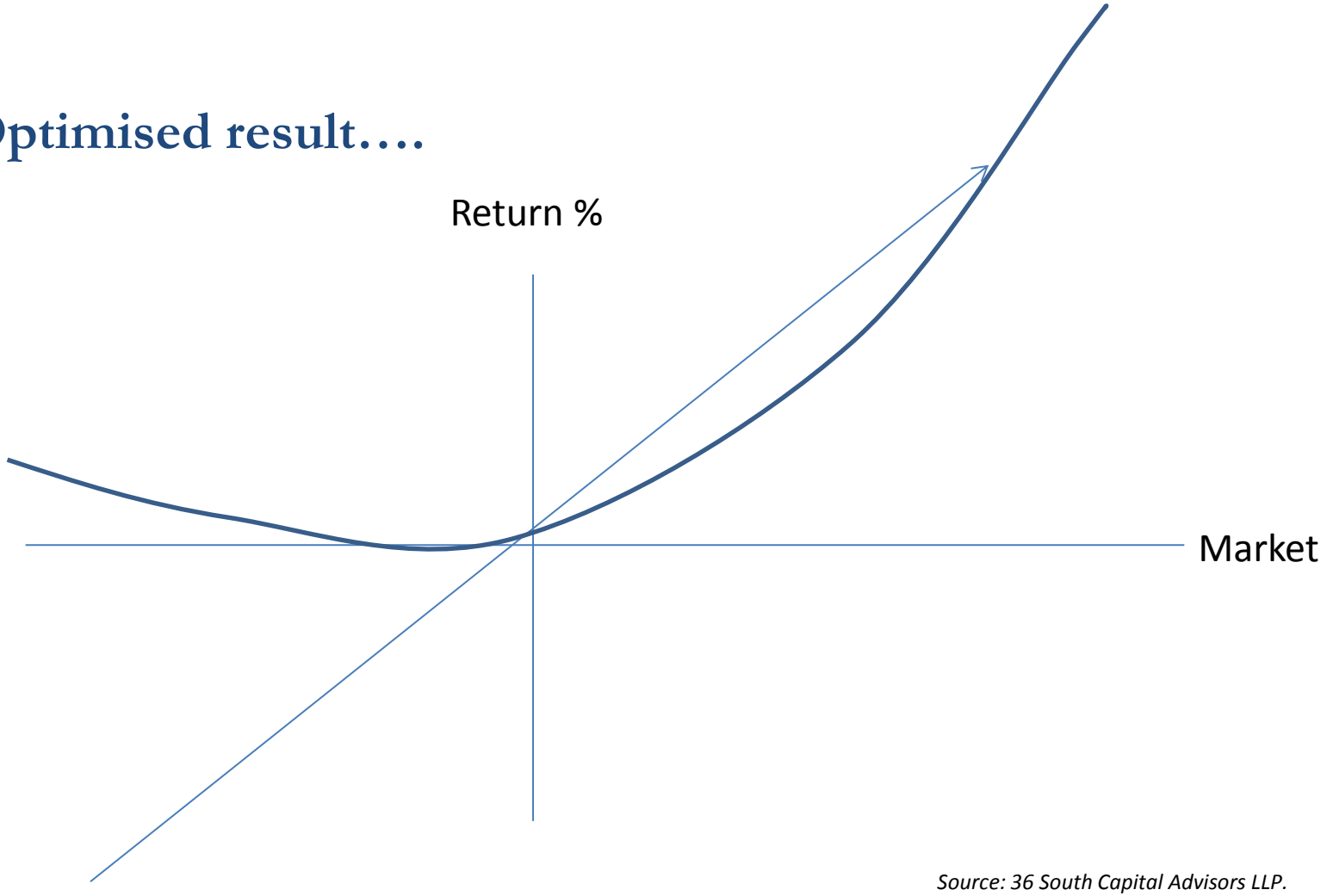
Optimised result:



Source: 36 South Capital Advisors LLP.

Volatility and time

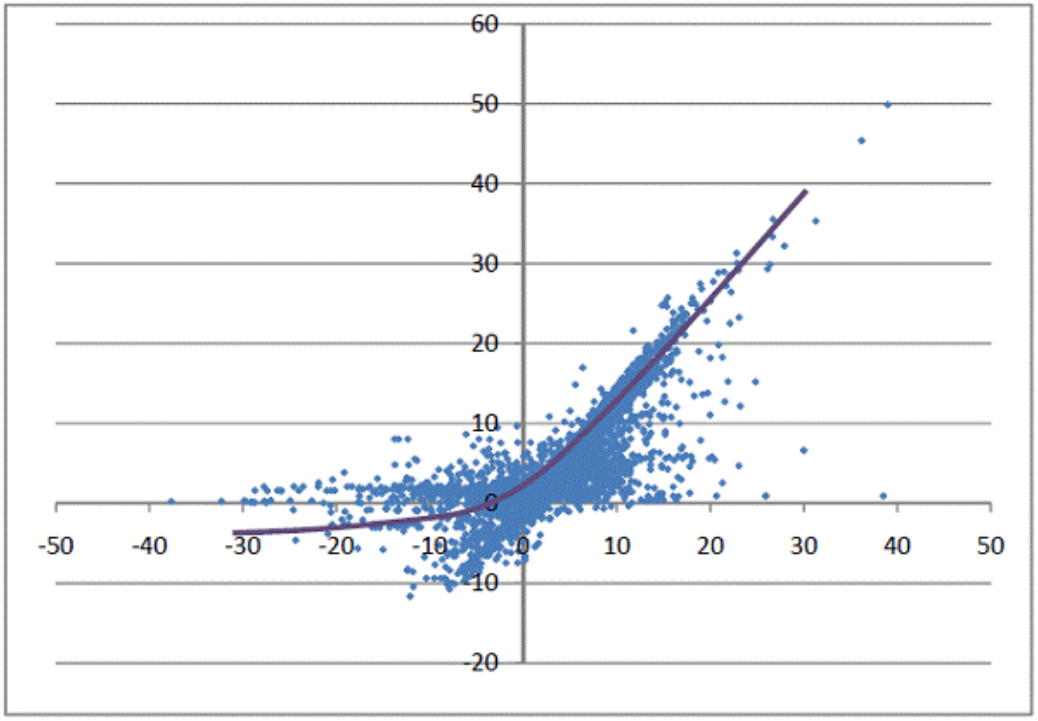
Optimised result….



Source: 36 South Capital Advisors LLP.

Volatility and time

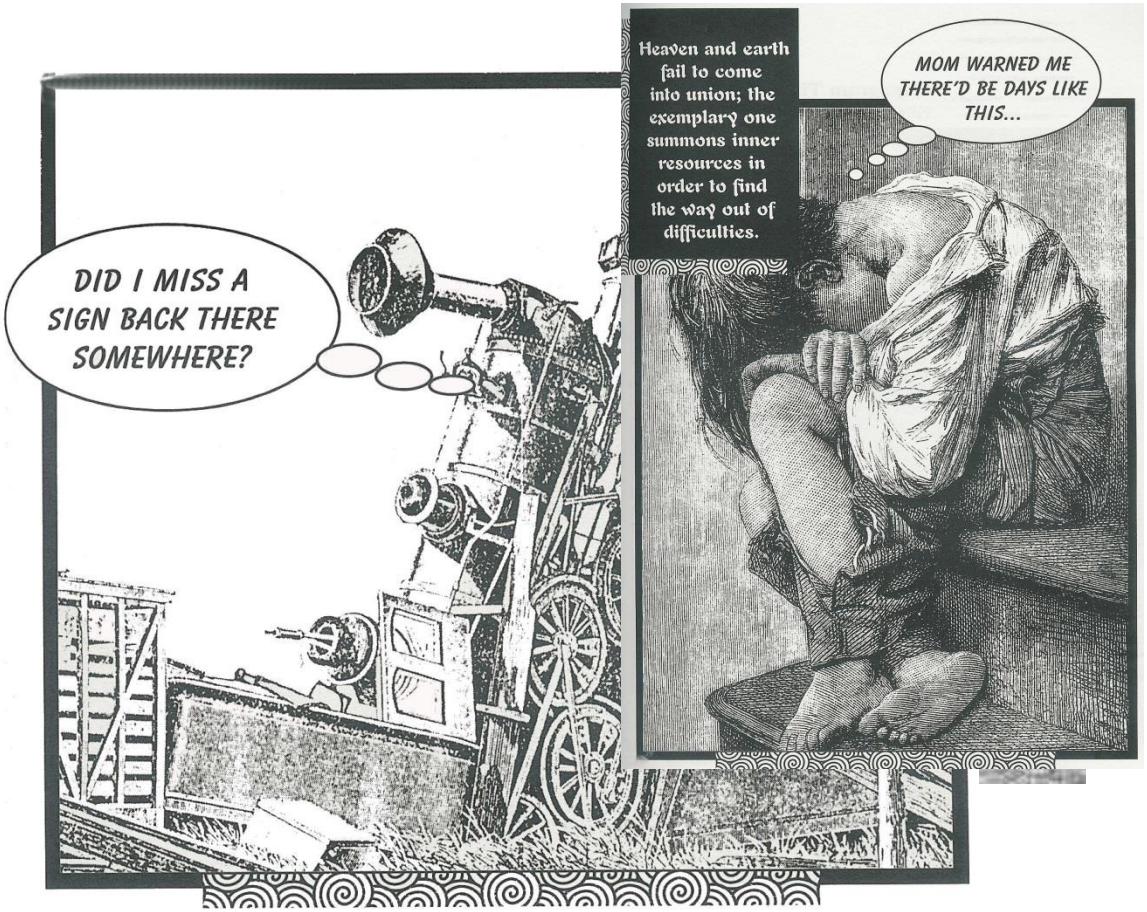
Most likely optimised result….



Source: 36 South Capital Advisors LLP.

Black Swans and time

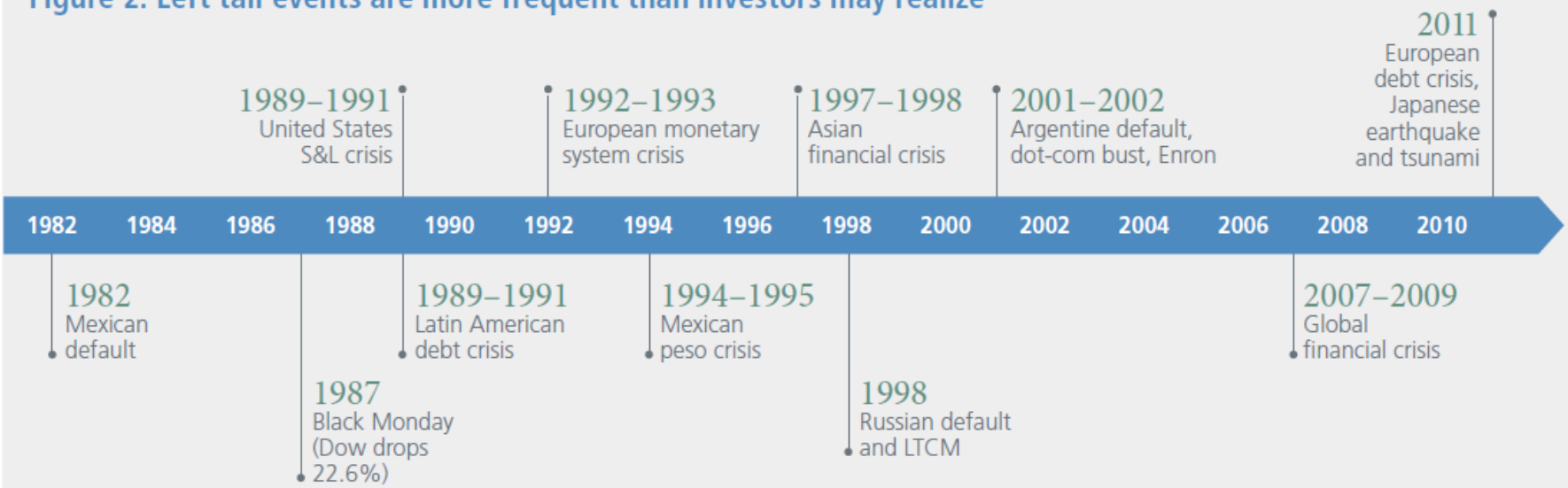
Black Swans will happen.



Black Swans and time

Frequency

Figure 2: Left tail events are more frequent than investors may realize



Source: PIMCO; Actual incidents (1982–2011).

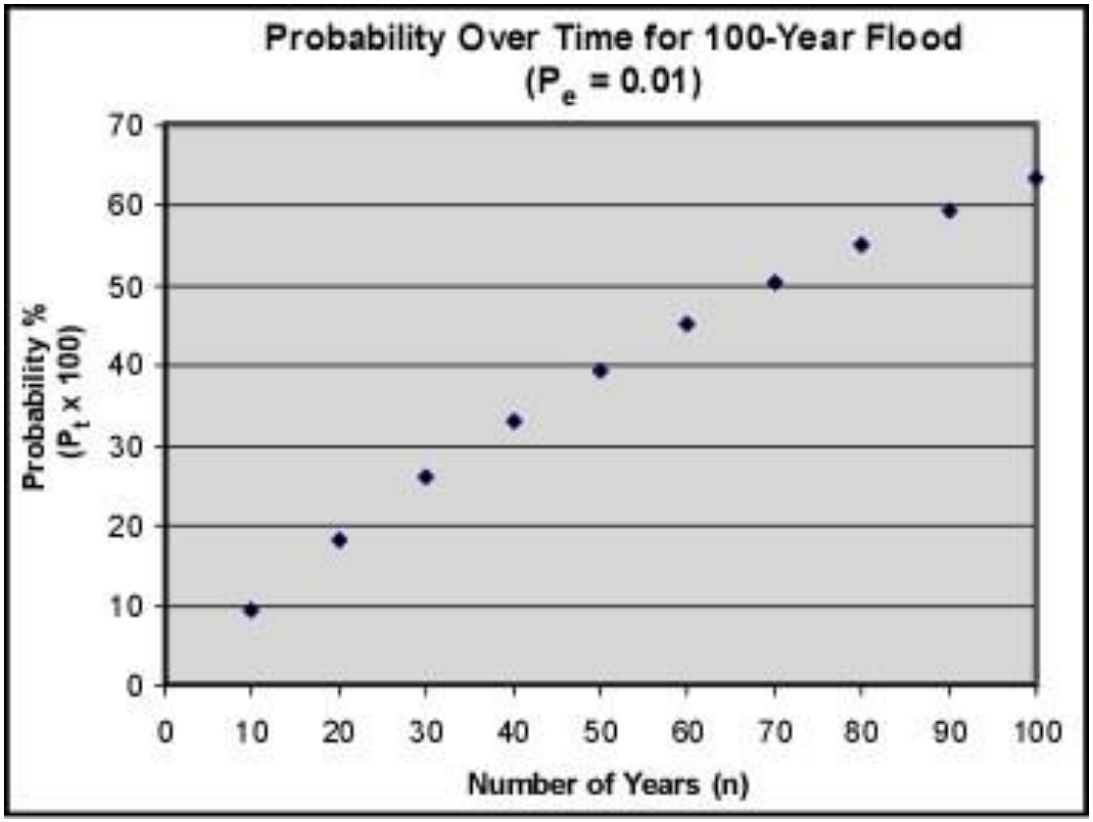
Black Swans

A "time" perspective?

- Unpredictable
- Rare / Low probability for a single period
- High cumulative probability for multi-period
- High consequence for compound or geometric growth

A"time" perspective?

Rare event Cumulative Probability



Source: Nelson, S. A., 2013. "The Risk to New Orleans – Present and Future" [online] Available at: http://www.tulane.edu/~sanelson/New_Orleans_and_Hurricanes/New_Orleans_Risk.htm [Accessed on 20th October 2013].

A "time" perspective?

Rare event Cumulative Probability

	Rare Event Probability over 40 years				
	P	(1-P)	Years		Probability
1	1%	0.99	40	0.67	33.10%
1	2%	0.98	40	0.45	55.43%
1	3%	0.97	40	0.30	70.43%
1	4%	0.96	40	0.20	80.46%
1	5%	0.95	40	0.13	87.15%

Source: 36 South Capital Advisors LLP.

Black Swans

A"time" perspective?

They are still:

- Unpredictable,
- Rare / Low probability for a single period.

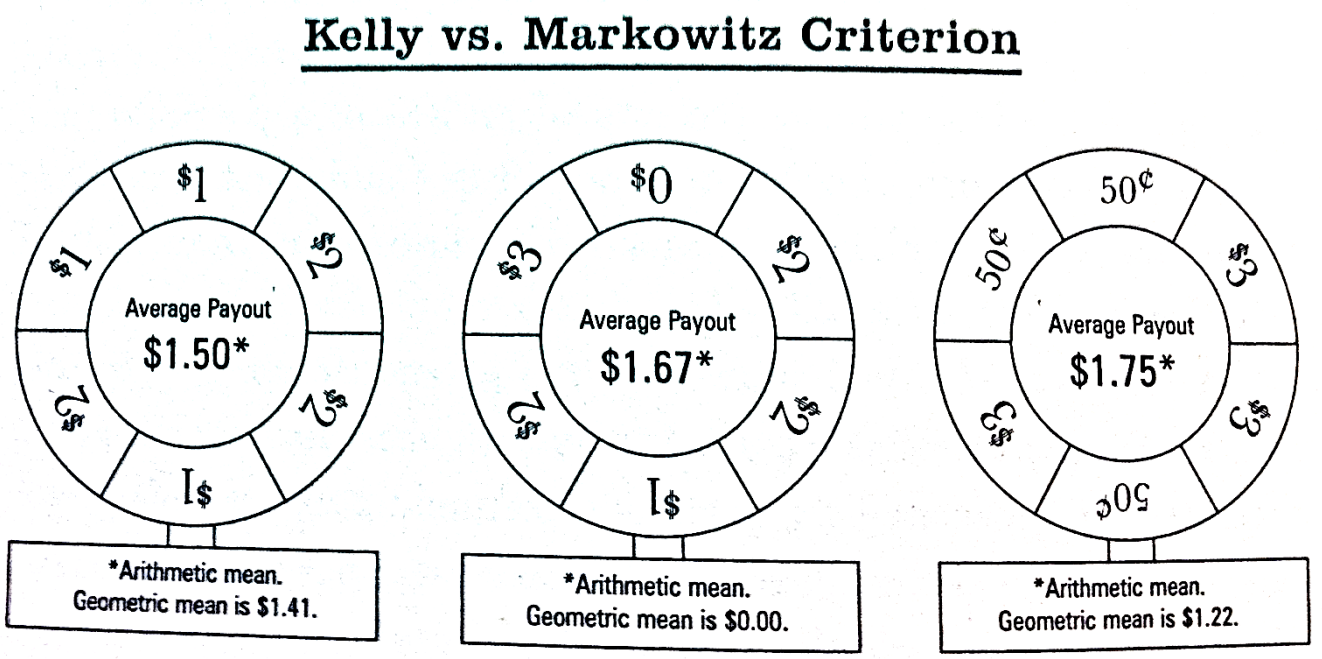
But there is:

- High cumulative probability for multi-period,
- High consequence for compound or geometric returns,

when thinking from a "time" perspective.

A"geometric" perspective?

High consequence for compound or geometric growth



Source: Poundstone, W. 2005 "Fortune's Formula: The Untold Story of the Scientific Betting System that Beat the Casinos and Wall Street", Hill and Wang, New York.

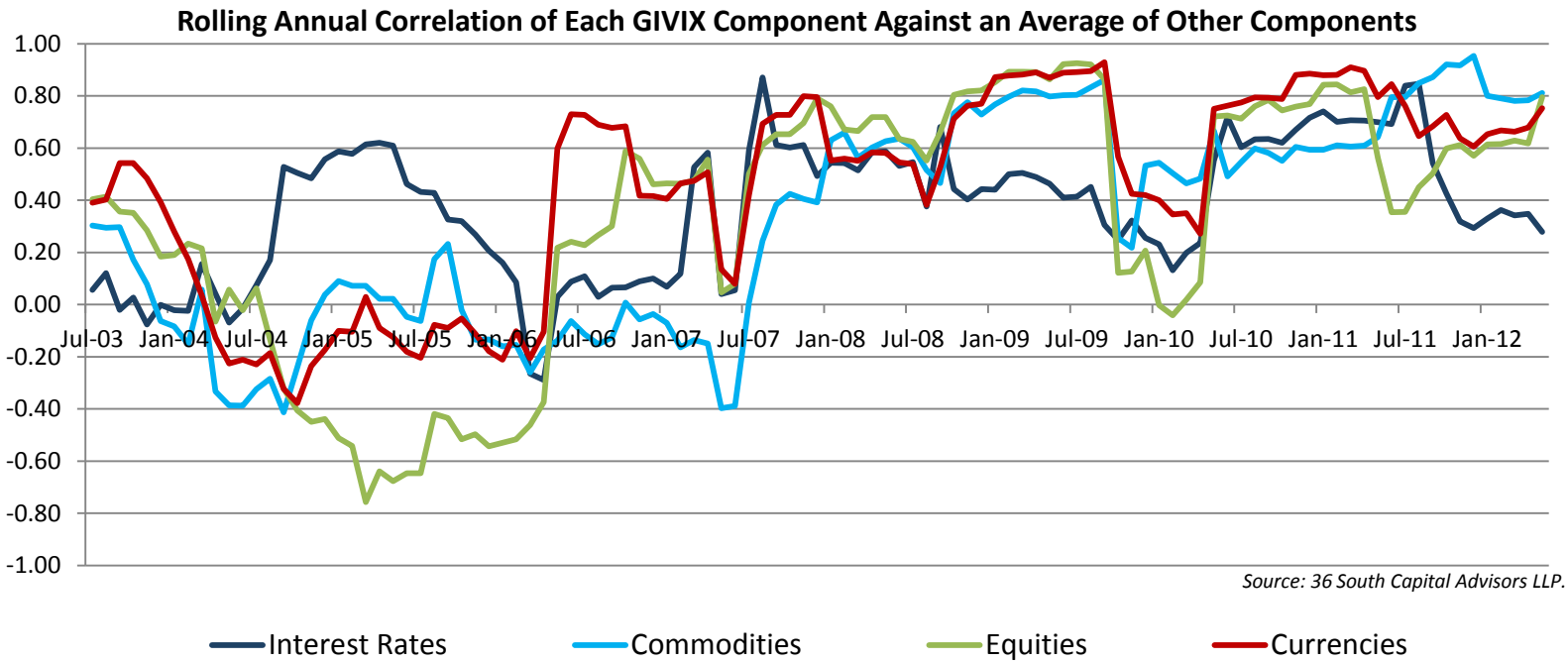
Why are we gambling with time?

Black Swan issues

- Direct or indirect hedges?
- Negative carry/ expected return.
- How much bang for my buck, i.e. convexity per $ spend?

Indirect hedges

- Volatility has approximately a 5-year cycle
- Different asset classes move in their own cycles and only correlate in times of crises



Indirect hedges

Geometric mean – Black swan hedging

"Bernoulli showed that a relatively poor merchant may improve his geometric mean by buying insurance (even when that insurance is overpriced) while at the same time a much wealthier insurance company is also improving its geometric mean by selling that insurance."

Source: Poundstone, W. 2005 "Fortune's Formula: The Untold Story of the Scientific Betting System that Beat the Casinos and Wall Street", Hill and Wang, New York.

Although tail risk hedging may be negative carry and negative expected return, it can improve the geometric mean return of the portfolio.

Black Swan issues

How much bang for my buck, i.e. convexity per $ spend?

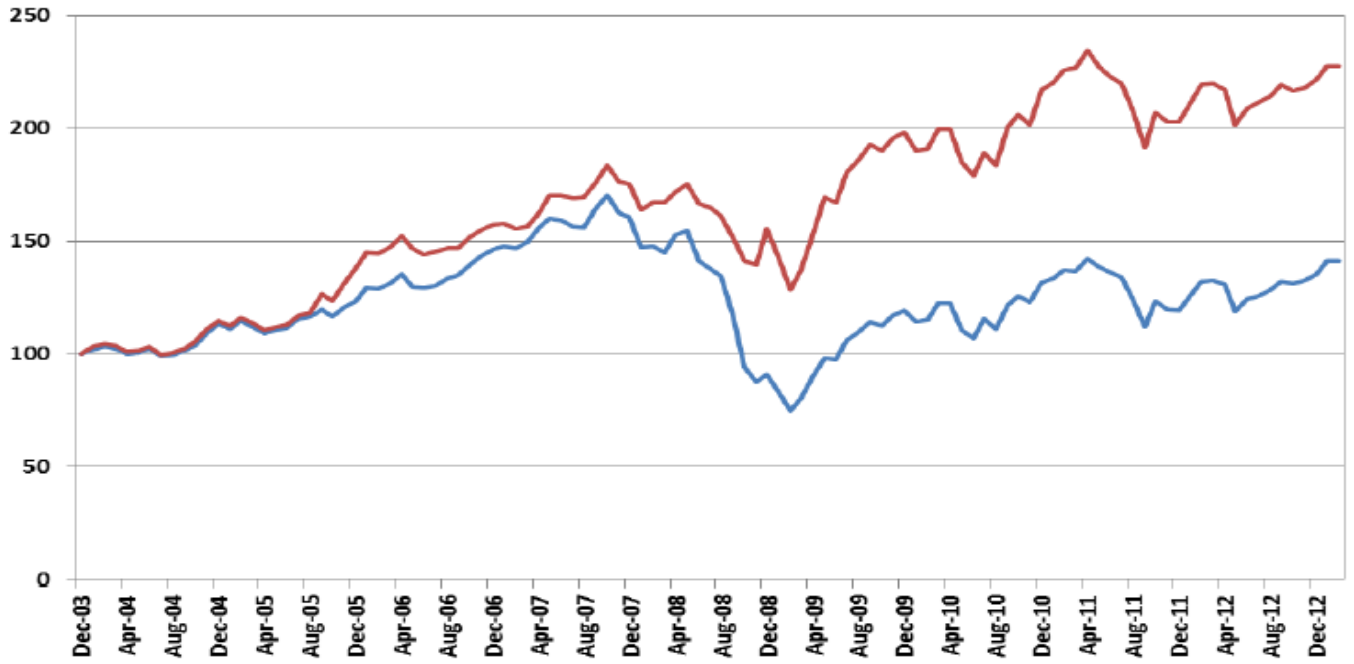
Rule of thumb: but hedge at or below its long term mean.

SPX Spot 1125 tail event: 710 Five year option strike 810	Multiples on tail risk event	Multiples on tail event
Volatility range		(adj. for conseq)
+3 standard deviations	1.1	2.7
+2 standard deviations	1.3	3.2
+1 standard deviations	2.0	5
Mean	4.3	10.7
-1 standard deviations	7.8	19.6
-2 standard deviations	18.9	47.2
-3 standard deviations	50.2	125.4

Source: 36 South Capital Advisors LLP.

Geometric mean – Black Swan hedging

Chart showing a 10% allocation to a long volatility strategy vs. MSCI Portfolio Unhedged in USD benchmark



Source: 36 South Capital Advisors LLP and Bloomberg. For illustrative purposes only.

Summary – tale of two portfolios

Portfolio started at age 20.

Summary – tale of two portfolios

Portfolio construction with geometric return goals maximises long run return whilst minimising risk of ruin.

Portfolio at age 60.

Summary – tale of two portfolios

Portfolio started at age 20.

Summary – tale of two portfolios

Portfolio Construction with MPT return maximisation ignoring volatility, time and tail risk.

Portfolio at age 60.

Conclusion

The role of volatility and tail events over time is ignored in Modern Portfolio Theory and it is leading its practitioners to massively mis-estimate real risk and producing lower long term compound growth.

Why are we gambling with time?

EPI BRIEFING PAPER

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THE STATE OF WORKING AMERICA'S WEALTH, 2011

Through volatility and turmoil, the gap widens

BY SYLVIA A. ALLEGRETTO

The deflation of the housing bubble which started in 2006 pushed the U.S. economy into recession by the end of 2007. As house prices fell and already low equity (due to second mortgages) vanished, foreclosures and "upside down" mortgages, in which homeowners owe more on their mortgages than their homes are worth, became a vicious cycle. Given the reliance of typical families on housing as a source of wealth, the housing debacle has devastated the net worth of millions of American households.

The Great Recession officially lasted from December 2007 through June 2009—the longest span of recession since the Great Depression. The recovery since then has proceeded on two tracks: one for typical families and [illegible] who continue to struggle against high rates of [illegible] and continued foreclosures, and another [illegible]ss and the wealthy, who have [illegible]k market and benefited [illegible]g as

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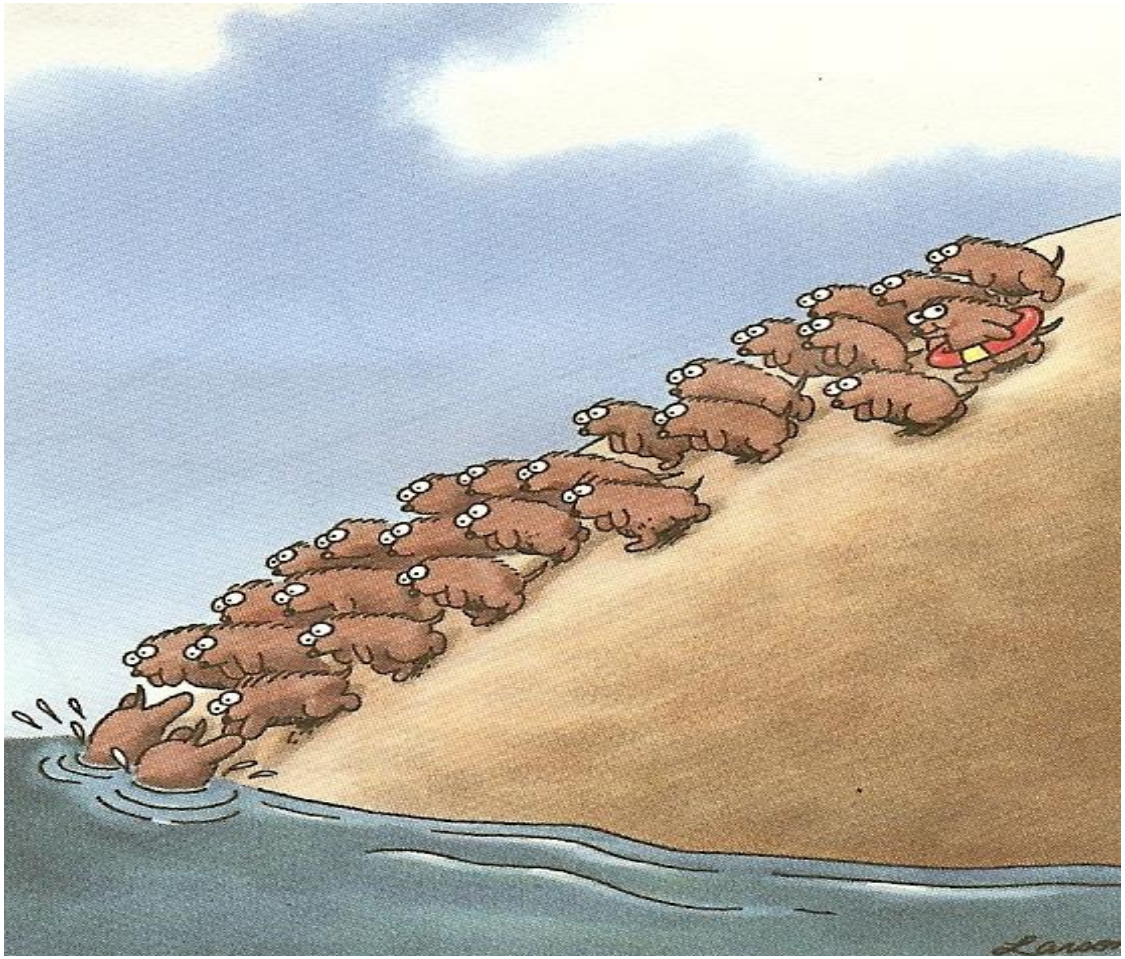
THE STATE OF WORKING AMERICA

The Economic Policy Institute's State of Working America series explores how America's workers are faring in today's economy.

Thank-you for your time!



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