


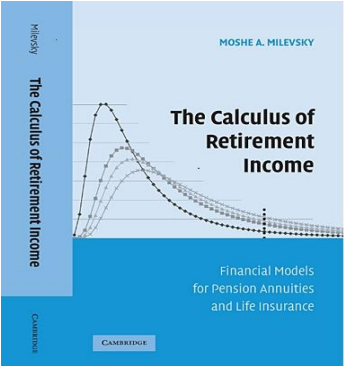
Some Behavioral Biases of Retirement Income Planning

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Executive Director, The IFID Centre
at the Fields Institute for Research in Mathematics

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40 minute agenda

- Review some well-known statistics and background material on the current state of Defined Benefit (DB) pension plans.
- Motivate the need to focus research on individual risk management.
- Offer some personal observations on what “...*they just don't get*...” as well as the role of the financial services industry in correcting these biases.

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The Death of D.B. Pensions

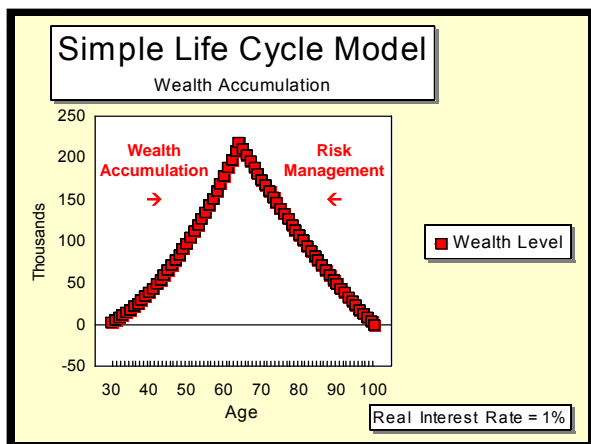
	Then (1985)	Now (2003)
Number of Corporate Defined Benefit Pension Plans in the U.S.	112,208	29,512

Source: Pensions & Investments, June 2005, U.S. Department of Labor
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The Death of D.B. Pensions

	Then (1980)	Now (1999)
Percent of Private Work Force Covered by Defined Benefit Pension	28%	7%

Source: Pensions & Investments, June 2005, U.S. Department of Labor
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1.) Retirees don't believe or understand the true nature of longevity risk

- Life expectancy in the U.S. is approximately **77 years at birth**, which is widely misunderstood to imply that you only live 12 years in retirement, on average.

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Conditional Probability of Survival at Age 65

To Age:	Female	Male
70	93.9%	92.2%
75	85.0%	81.3%
80	72.3%	65.9%
85	55.8%	45.5%
90	34.8%	23.7%
95	15.6%	7.7%
100	5.0%	1.4%

Source: Society of Actuaries RP-2000 Table with full projection.

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A Couple Aged 65....Survival:

To Age:	At Least One...
70	99.5%
75	97.2%
80	90.6%
85	75.9%
90	50.3%
95	22.1%

Source: Society of Actuaries RP-2000 Table (with full projection)

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What Reduces Your Retirement Mortality Rates (Beyond the Obvious)?

All Genders	- Parents Lived Beyond Age 75 - Mentally Active During Retirement
Male Only	- Being Married
Female Only	- Being Single or Divorced

Source: Max Planck Institute for Demographic Research
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What will be your cause of death?

	Estimate	Actual
Heart Disease:	22%	34%
Cancer:	18%	23%
Other Natural:	33%	35%
Accident:	32%	5%
Homicide:	10%	1%
Other Unnatural:	11%	2%
TOTAL:	126%	100%


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N.B.E.R. Study
 Based on Data from H.R.S.


- “...peoples’ perception of their own mortality risks are **systematically biased**...”
- “...many people respond with **0% and 100%** when asked to estimate the odds of living for **20** more years...”
- “...people with relatively **low life** expectancy tend to be **over-optimistic** and people with relatively **high life** expectancy tend to be **over-pessimistic**...”

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 2.) Retirees have subjective discount rates that are too high...


- Your **biological interest rate** is much higher than the market's **economic interest rate**.
- In plain English, you much rather **eat better today**, compared to the alternative of **eating much better, tomorrow**.

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 Subjective Discount Rates

- J.T. Warner and S. Pleeter study of military personnel published in the *American Economic Review* (March 2001).
- During the period 1991 – 1995, the Department of Defense (DoD) offered a departing choice to over 11,000 officers and 55,000 enlisted personnel.
- Army, Navy, Air Force.
- They were given a choice between a **lump-sum** versus a **payout annuity**, with exact parameters depending on the number of years of service.

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 Typical Choice for Separating Personnel

\$17,000 per year **or** +/- \$100,000
for 30 years lump sum

Note: At the time, long-term rates were approximately 7%

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What is the Present Value?
 \$17,000 per year, for 30 years

Interest Rate	Discounted \$ Value
7%	210,000
10%	160,000
17%	100,000
20%	85,000
30%	57,000

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Who took the lump-sum?
Personal discount rates higher than 17%

	Army	Navy	Air Force
Officers	53.7%	62.2%	45.0%
Enlisted	95.0%	87.5%	90.7%

Source: Warner and Pleeter (AER, 2001)

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What do we learn?

- Offering a lump-sum payment saved taxpayers **\$1.7 billion** in severance costs.
- Military personnel have very **high personal discount rates**, but this experiment has been replicated with other segments of the U.S. population (e.g. college students).
- According to the *W.S.J.* (2/25/98), the average discount rate at J.G. Wentworth and Co. is 21%
- These facts do not provide encouraging evidence in favor voluntary **annuitization**.
- Everyone has a **biological interest rate**...

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3.) Retirees underestimate the cost of living and confuse it with inflation...

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Inflation: What Does a \$1,000 Payment, Really Buy You?

Years in Future Realized inflation rate during each year....

	0%	1%	2%	4%	6%	8%	10%
1	\$1,000	\$990	\$980	\$962	\$943	\$926	\$909
5	\$1,000	\$952	\$906	\$822	\$747	\$681	\$621
10	\$1,000	\$905	\$820	\$676	\$558	\$463	\$386
15	\$1,000	\$961	\$743	\$555	\$417	\$315	\$239
20	\$1,000	\$820	\$673	\$456	\$312	\$215	\$149
25	\$1,000	\$780	\$610	\$375	\$233	\$146	\$92
30	\$1,000	\$742	\$552	\$308	\$174	\$99	\$57
35	\$1,000	\$706	\$500	\$253	\$130	\$68	\$36

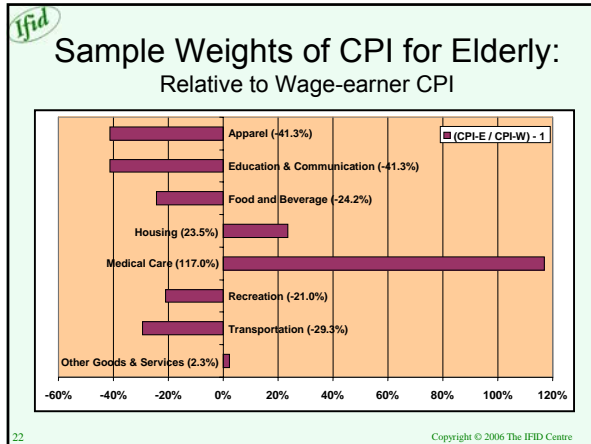
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CPI (U,W) vs. CPI-E

- The elderly face unique inflation risk...
- The typical basket of consumption for a retiree differs from the one used to compute the CPI.
- This has substantial implications for retirement planning...

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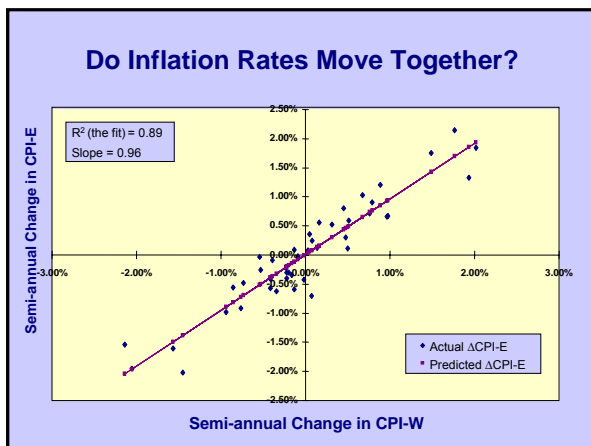


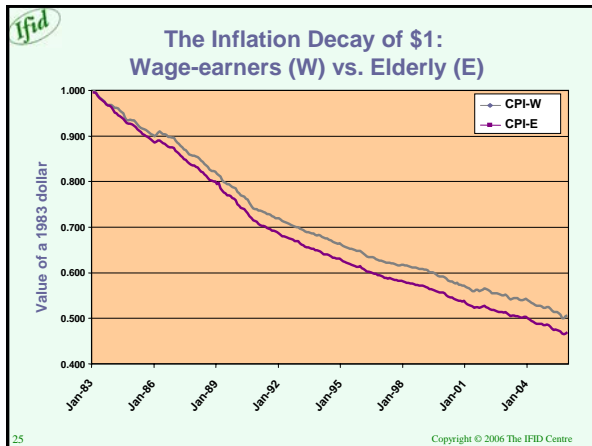
Inflation: Relative Weights

Category	CPI	CPI-E
Food:	17.9%	14.3%
Housing:	37.6%	45.9%
Apparel:	3.9%	2.8%
Transport:	18.8%	13.8%
Medical Care:	5.1%	10.2%
Recreation	5.3%	4.4%
Education	5.1%	2.9%
Other	6.1%	5.6%

Source: U.S. Department of Labor, Bureau of Labor Statistics
 Note: These weights change over time and are not fixed.

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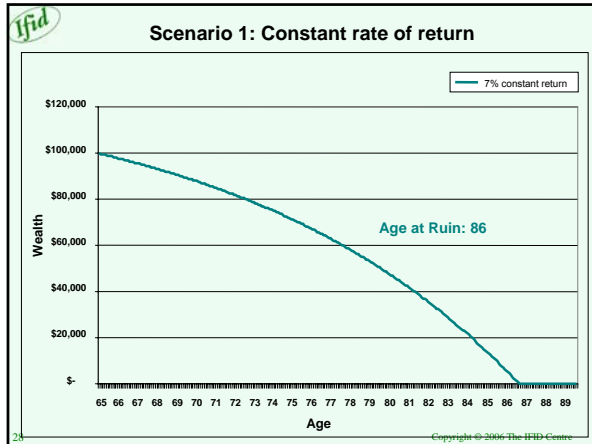


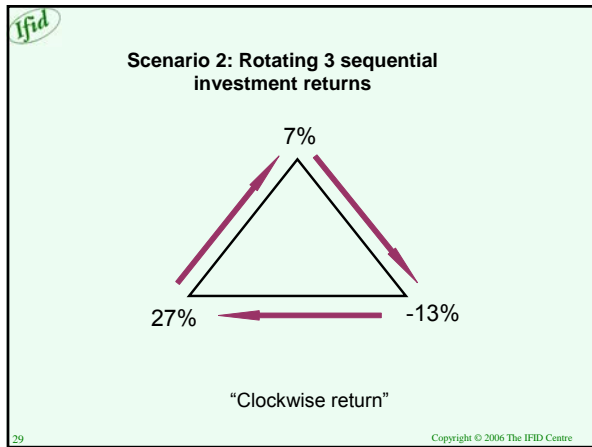
4.) Retirees don't understand and appreciate the algebra of withdrawals

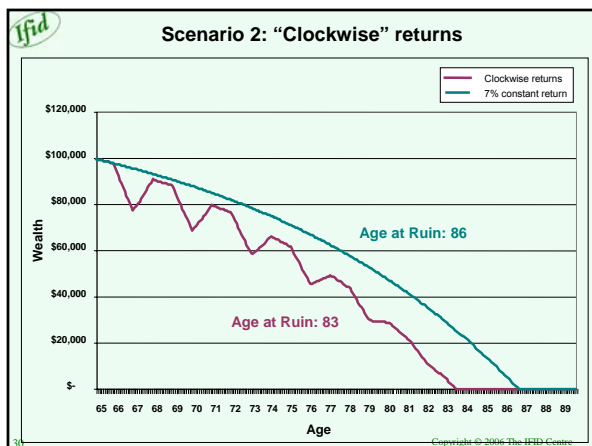
A very simple example of retirement income...

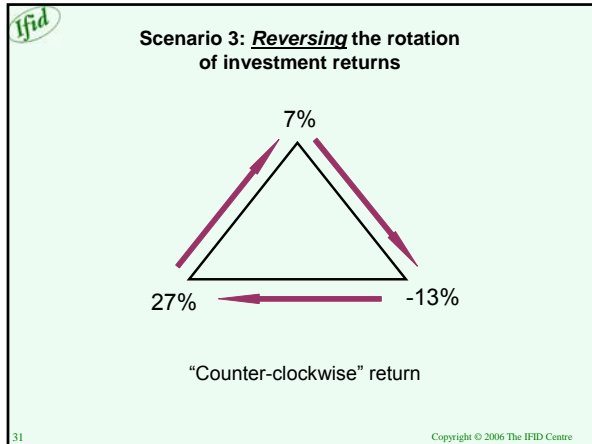
Age 65 retirement wealth: \$100,000
Monthly withdrawal: \$750 (= \$9,000 per year)
Annual Investment return: Constant APR of 7%

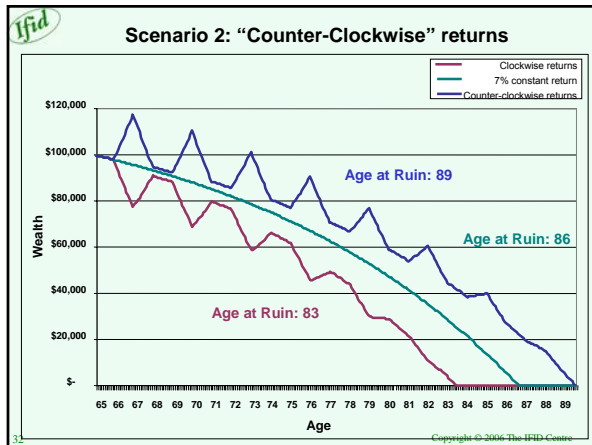
At what age will you run out of money?

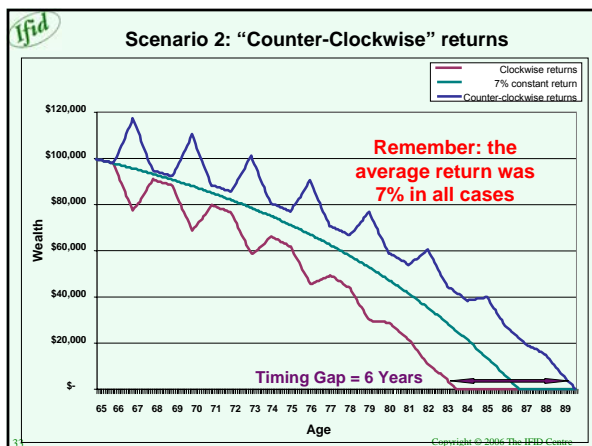












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What stop did you get on the retirement merry-go-round?

Return Sequence	Ruin Age	+/- Months
+7%, +7%, +7%...	86.50	
+7%, -13%, +27%...	83.33	-38
+7%, +27%, -13%...	89.50	+36
-13%, +7%, +27%...	81.08	
+27%, +7%, -13%...	94.92	

* Assumes \$9,000 spending per year. Copyright © 2006 The IFID Centre

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-13%, +7%, +27%...	81.08	-65
+27%, +7%, -13%...	94.92	+101

* Assumes \$9,000 spending per year. Copyright © 2006 The IFID Centre

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5.) Investors generally trade too much ...and aging doesn't help.

- This applies broadly to all ages, but more specifically to retirees.
- Do-it-yourself might be hard-wired to fail...

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Investors Trade Too Much... ...And Males more than Females

Female Premium	
All Females	+1.1% per annum
Married Females	+0.9% per annum
Single Females	+1.7% per annum

Source: B. Barber & T. Odean, *Quarterly Journal of Economics*, Vol. 116 (Feb/2001)
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...And Aging Does Not Help

Relative Alpha for Group	
Age 20 – 38:	+12%
Age 39 – 46:	+6%
Age 47 – 52: (Baseline)	0%
Age 53 – 59:	-10%
Age 60 – 94:	-15%

Source: Korniotis & Kumar, *University of Notre Dame*, 2005
Table VII (B), Medium Education
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U. of Notre Dame (2005) Study

- Study of over 77,000 households during the period 1991 to 1996... (N.Y.T. article on Dec/5, 2005)
- "...Consistent with the psychological evidence, we find that older investors exhibit worse stock selection ability and poor diversification skill..."
- "...Thus, older people would be better off economically if they try to compensate for the adverse effects of aging by seeking advice from a financial advisor or other qualified investment professional..."

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6.) People generally confuse probabilities, prices and values

- Just because the odds are slim, it doesn't mean protection is cheap and vice versa.
- You may have to pay a high price for insurance, even if the probability of ever using the insurance is small.

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What is a Guarantee **Worth**?

Value
(Utility)

Probability

Cost
(Manufacturing)

Price
(Market)

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Jack wants an **investment guarantee**:
What does it cost in the Capital Markets?

- His IRA account value is **\$500,000**
- He wants to buy **put** options on the S&P500 index
- They are available on the Chicago Board Options Exchange (www.cboe.com)
- Can Jack protect his IRA?

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How much does a one-month put option (i.e. money back guarantee) cost?

Spot price of S&P500 unit on Dec/23 was: \$1,268.66
 Price of at-the-money put option was:

Puts	Last Sale	Net	Bid	Ask	Vol.	Open Int
2006 Jan 1270	12.00	-0.50	11.30	12.50	919	7212

Option Symbol: SZP MN-E
 Option Expiration: Last week of January 2006
 Strike Price: 1270 Ask Price: **12.50**

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How much does protection cost?

One Unit	# of Units in Contract	Value of contract	# of contracts Jack needs
\$1,268.66	100	$\$1268.66 \times 100 = \$126,866$	$\$500,000 / \$126,866 = 4$

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How much does protection cost?

Cost of one Option Unit	Cost of one Contract	Cost of Four Contracts
\$12.50	$\$12.50 \times 100 = \$1,250$	$\$1,250 \times 4 = \$5,000$

Jack pays \$5,000 (or 1%) to protect his \$500,000 IRA for one month

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Horizon and the Cost of a Put Option
 On December 23, 2005

Option Expiration	Upfront Cost	Annualized Cost
1 Month (Jan 06)	1.00%	
1 Year (Dec 06)	4.40%	440 b.p.
2 Years (Dec 07)	6.14%	307 b.p.
3 Years (Dec 08)	7.58%	253 b.p.

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- Take Away Points...**
- Investors and retirees make systematic mistakes if left alone...which is why and how the informed advisor can add value.
 - The biases are related to:
 - Longevity Risk and Uncertainty
 - Subjective Discount Rates
 - Inflation vs. Cost of Living
 - Withdrawals and Sequencing
 - Excessive Trading and Impact of Aging.
 - Value vs. Probability of Using Insurance
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