Integrating behavioral finance in Retirement plan designs

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Abstract

- Behavioral finance research challenges some of the most central assumptions of decision-making
- Questioning the traditional approach of life-cycle, risk return, risk aversion and MPT
- Questioning the analytic approach to the solution and portraying the affective/emotional approach

Overview

- Retirement Lifecycle
  - Three stages
- Saver characteristics
  - Three segments
    - Successful planners, Secure doers, Avoiders
- Behavior
  - By stage and segment
- Plan design

Life cycle hypothesis: stages

- **Stage 1: There is no tomorrow**
  - **Dis-savers, borrowing (debt) from the future to boost current consumption**
- **Stage 2: Caught in the headlights**
  - **Net savers, purchasers of financial assets, accumulate for retirement as a hedge against decline in retirement living standard**
- **Stage 3: Who's afraid of dying poor**
  - **Earnings dwindle/disappear, de-cumulation of assets**

Study Sample: Quantitative Phase

	Participants	Non-participants	Total
Sample Size			
401(k),403(b)	815	326	1141
Sample Demographics			
Male(%)	67	66	6
Female(%)	33	34	33
Household Income			
Under $25,000.00	4%	12%	5%
$75,000.00 or more	32%	36%	17%
Marital Status			
Married(%)	77	60	73
Not married, living w/partner	2	4	2
Single	11	19	13
Divorce	8	16	10
Widowed	1	2	2

Study Sample: Quantitative Phase

	Participants	Non-participants	Total
Work Stage			
Beginning (%)	12	32	17
Middle	55	37	50
End	32	29	32
Education			
High School Graduate	22	29	23
Associate Degree	36	45	38
4 years College or Higher	41	22	57
Occupation			
Clerical	7	8	7
Blue collar	22	33	25
White collar/ professional	58	37	52
Children under age 18(%)	45	52	47

Saver Characteristics
The pie of success and failure

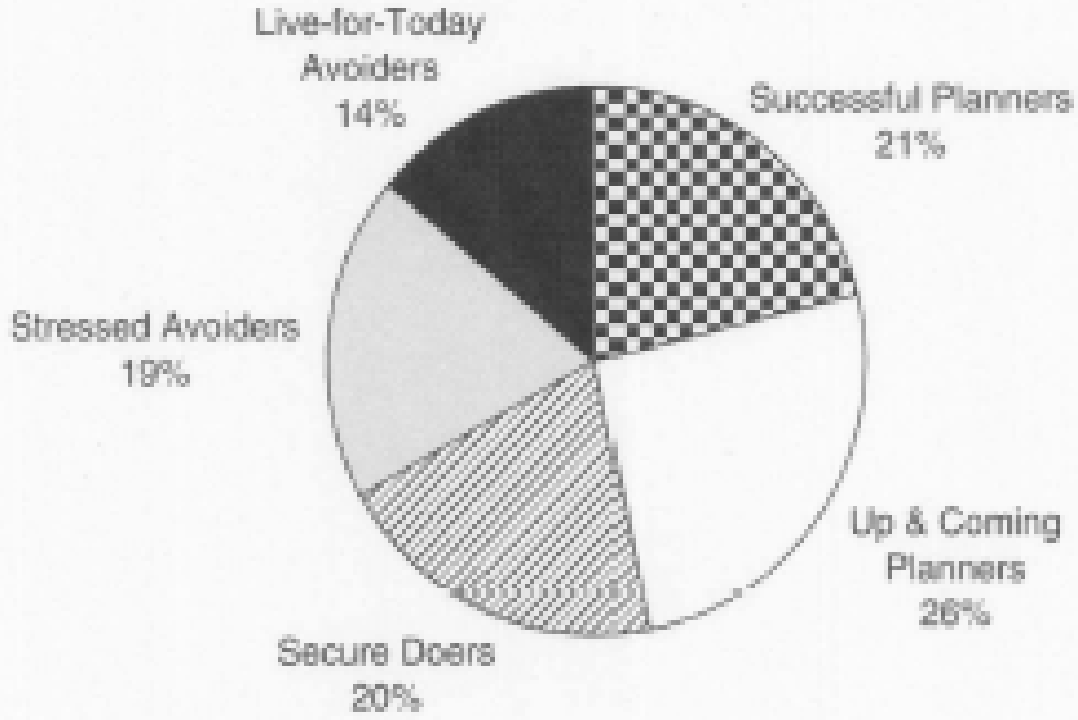


Figure 6-1. Five "money attitude" segments.

Source: The Vanguard Group (2002).

_____	Successful and Up and Coming Planners	Secure Doers	Stressed and Live for Today Avoiders
N	535	229	377
(%)	(47)	(20)	(33)
Vision of Retirement	Possess a strong vision with clear goals and aspiration	Less goal focused	Slightly worried about the future
	Has some uncertainty	Willing to adjust to lifestyle to resources	Not goal or vision oriented
Interest in Retirement and financial planning	Enjoy planning and dealing with finances	Strong interest in saving for the future	Slightly focused on financial planning
	Derive satisfaction from managing money	Not as concerned with planning or managing their money	Slightly stressed about the future but still enjoying the present

	Successful and Up and Coming Planners	Secure Doers	Stressed and Live for Today Avoiders
Preparation for retirement	Optimistic they will meet retirement goals	Optimistic about retirement	Not very concerned with retirement needs
	Least concerned about having enough money	Likely to save sufficiently for future	Confidence in Social Security
Savings behavior/ deferral of gratification	Disciplined savers	Willing to save for future	Little satisfaction from saving
	Derive satisfaction from saving		Little worrying about the future

Identifying Statements

Successful and Up and Coming Planners	Secure Doers	Stressed and Live for Today Avoiders
I am optimistic about my financial future	Often review my finances	Retirement is too far away - pointless to plan
I enjoy managing my retirement finances	It is important to manage money	I have more important things to do
I am well disciplined and pay off my credit cards on time	I get great satisfaction in saving	I feel stressed when thinking of money
I know how much I need to save	I am in a position to meet my goals	Not willing to make sacrifices
I will meet my goals	I worry about having enough money	My leisure time is too important

Retirement wealth and savings adequacy

- **Descriptives and demographics**
  - **By Wealth AND By Earnings**
    - **Net Financial**
    - **Net Housing**
    - **Pension**
    - **Social security**

Projected Retirement Wealth and Saving Adequacy

Mean Value and Composition of HRS Wealth (1992) by Wealth Decile

Wealth Quintiles	Total Wealth	Net Housing Wealth	Net Financial Wealth	Social Security Wealth	Pensions Wealth
⇨ 1	$39,470.00	$(5719) -14%	$1,520 4%	$42,312 107%	$1,356 3%
2	$156,288.00	$24,951 16%	$18,235 12%	$93,920 60%	$19,181 12%
3	$287,692.00	$53,787 19%	$55,020 19%	$128,377 45%	$50,809 18%
4	$459,858.00	$81,432 18%	$109,811 24%	$142,981 31%	$125,635 27%
⇨ 5	$804,934.00	$112,039 14%	$265,967 33%	$158,976 20%	$267953 33%

Projected Retirement Wealth and Saving Adequacy

Median Prescribed Saving and Replacement Rates

			SAVINGS TO AGE 62 (%)		SAVINGS TO AGE 65(%)	
	Wealth Quintiles	Median Household Net Wealth	Saving Rate	Replacement Rate	Saving Rate	Replacement Rate
⇨	1	$43,900.00	38.30	48.70	26.90	58.80
	2	$156,600.00	26.80	58.30	15.50	67.70
	3	$286,500.00	18.10	67.50	8.90	76.10
	4	$158,900.00	11.40	73.30	3.00	81.40
⇨	5	$792,600.00	1.00	88.30	(6.10)	96.60

Comparison of HRS Prescribed Saving Rates and CES Actual Rates

Household Earnings	HRS Prescribed Saving Rate (%)			Actual CES Savings Rates (%)
	AGE 62	AGE 65		
20,000	6	(1.9)	?	2.3
30,000	16.8	8.5	>	2.8
40,000	17.7	10.0	>	3.3
50,000	17.9	11.1	>	3.7
60,000	20.2	13.1	>	4.1
70,000	20.3	13.5	>	4.5
80,000	21.1	14.2	>	5.0
90,000	20.5	13.3	>	5.4

Life cycle hypothesis: basics

- To be a good retirement saver
  - Somewhat accurately calculate uncertain future cash flows from earnings, assets, tax rates, changing familial structure, health status, longevity, risk tolerance and return requirements, etc
    - Mostly stochastic processes
  - Using above ability, accurately calculate the TVM implications of retirement and current savings needs and their timings
- OR NOT

General implications

- **Framing**
  - **Negative/positive approach and imagery**
- **Preference reversal**
  - **No preconceived (i.e. firm) preference schedule**
    - **Change plan by framing (+/-): rational expectations?**
  - **Preferences not hard wired: <u>Menu design</u>**
  - **Default / SMART Plans / Choice overload**
  - **In experiments, retirement savers are content (even happier) with median vs. own pension portfolio**
    - **8 out of ten participants chose median over own plan**

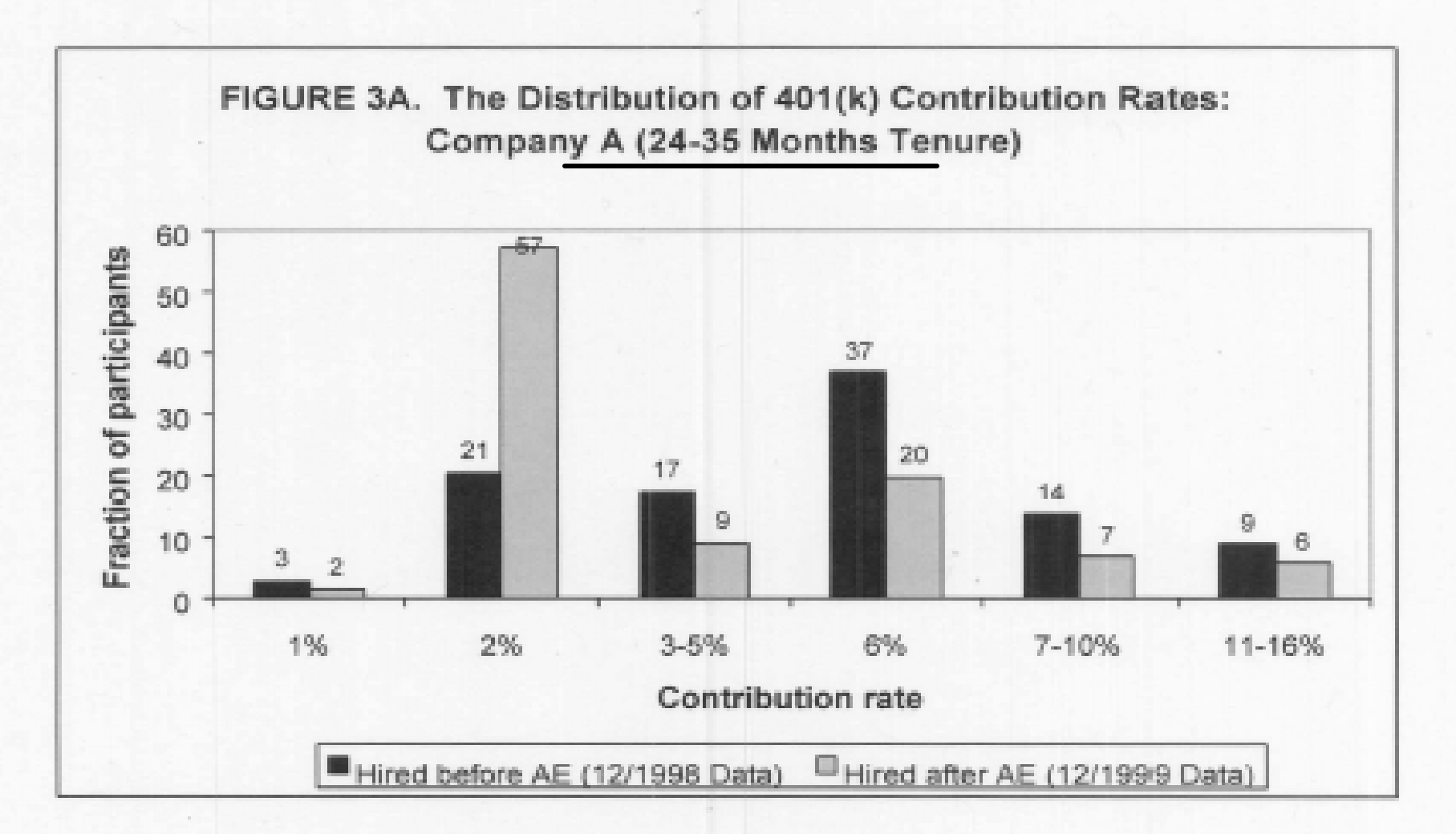
Perceptions of Company Stock Risk and Return

Participation Report:		**Actual Av. St. Dev. Of Company Stock**	**Actual Av. Company Stock**
Level of Risk in Company Stocks**	% of Participants	(%)*	Return (%)*
More risky	33	40**	-8.8 **
Same Level of risk	42	36**	-2.0 **
Less risky	22	31**	2.2 **
Don't Know	3	35	-6.0
Total	100%/**415**		
S&P 500		18 **	-1.1 **
Returns on five-year period ending Sept. 30 2003			
Source: Vanguard Group (2003)			

General implications

- **Menu design: Implications for**
  - **GR1**
    - **Choice overload**
    - **Lower savings if default**
  - **GR2**
    - **Needs help most**
    - **Afflictions**
      - **Inertia, procrastination, boundary conditions**
      - **Follow path of least resistance**

Auto enrollment



General implications

- Preference – not hard wired
- Menu design influence on investments
  - OVER MPT, risk aversion and risk-return
  - Experiment: Three, two asset funds, allocation to stock, in parenthesis
    - Stock/bond (54%), stock/balanced (73%), bond/balanced (35%)
    - Common – approaches 50-50%
    - Glidepaths

Behavior in Retirement Decisions

- Inertia and procrastination
  - Default systems
    - Auto enrollment/Glidepath/Target date
      - The less the employee knows the better
    - E.g. Default - Accumulated ret savings roll over automatically to a fixed annuity
      - Managing longevity risk
      - Opt out into lump sum
      - Evidence on Annuitization
        - Retirees receiving Annuities are happier
      - Of $120 billion in annuity (1999) sales, majority of sales were of variable annuities from pension distributions

Procrastination

Table 1. The Self-Control Problem: Divergence between Desired and Actual Behavior

Action	Planned Change (%)	Actual Change (%)
Enroll in 401(k) plan	100	14
Increase contribution rate	28	8
Change fund selection	47	15
Change fund allocation	36	10

Source: Choi et. al. (2001a), Table 6.

Auto enrollment

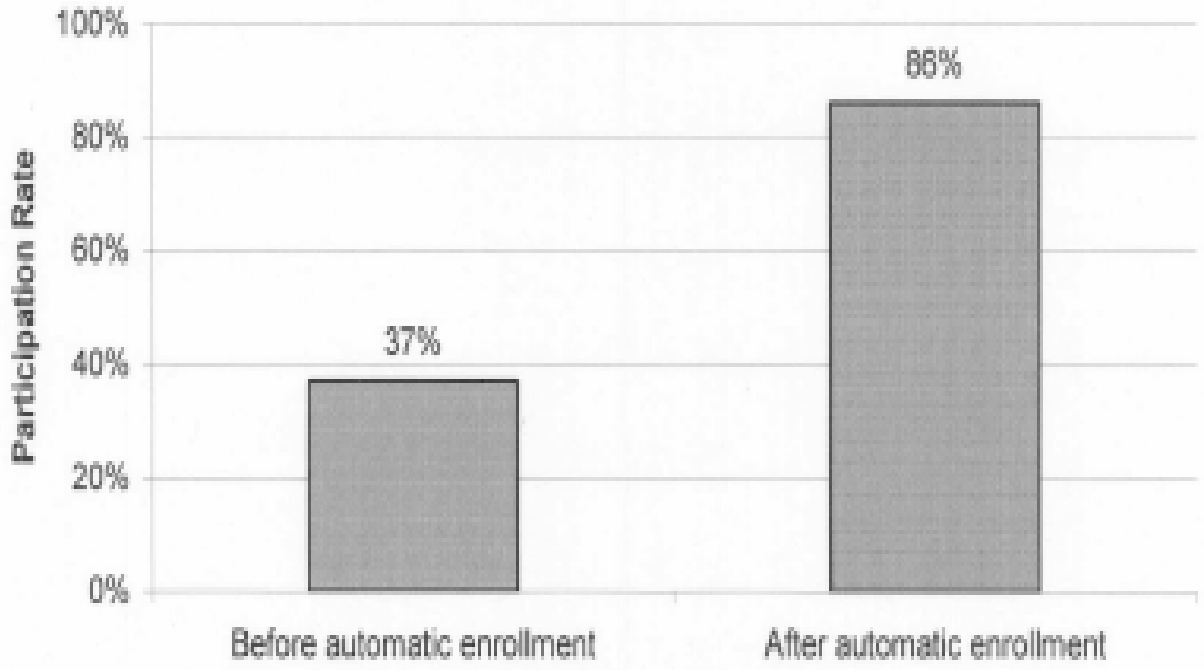


Figure 2. Decision Framing: The Impact of Automatic Enrollment on New Hire Plan Participation Rates

Source: Madrian and Shea (2002)

Behavior in Retirement Decisions

- **Inertia and procrastination**
  - **Default systems**
    - **!! Lump sum distributions became available from DB plans in the 2000s**
      - **75% distributions became lump sum**
      - **33% of retirees know that attaining age 65 implies a significant chance of outliving life expectancy**
    - **SMART Plan**
      - **Using the power of inertia**

Get SMART

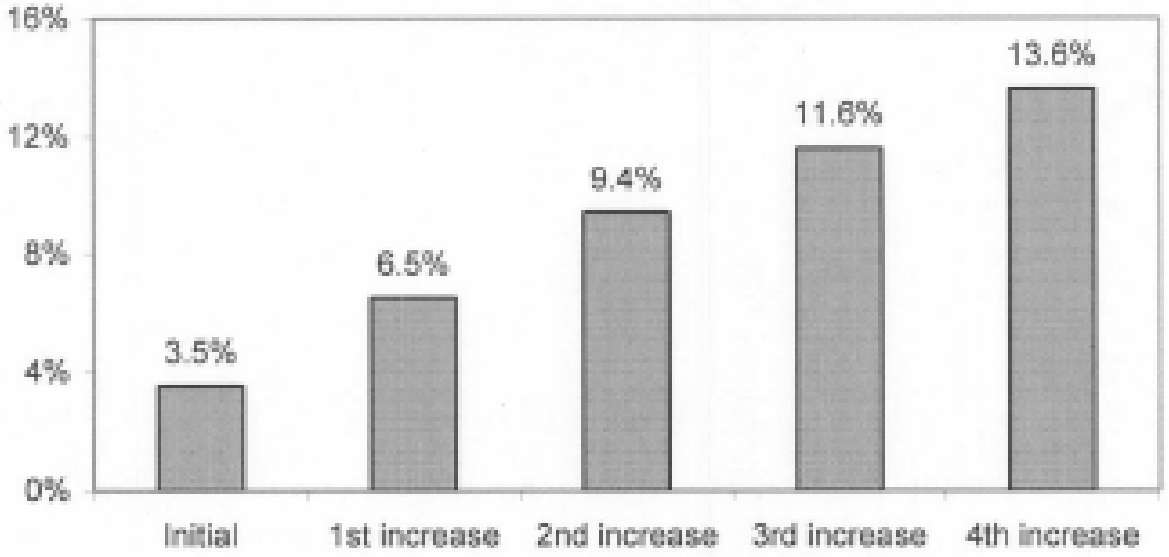


Figure 3. The Impact of Commitment Devices and Inertia: The Impact of SmarT on Plan Saving Rates

Source: Thaler and Benartzi (forthcoming)

Behavior in Retirement Decisions

- Inertia and procrastination
  - Annuitization vs. lump sum distribution
    - Experiment – dept of defense (1992)
      - 65000 officers and enlisted personnel in reduced staffing program
      - Offered ret plan payments either as annuity or lump sum
      - IRR on annuities were between 17.5 – 19.8 % when Treasury bond risk free rate was 7%
        - Economists estimate – all officers and half enlistees would choose annuities
        - 52% of officers and 92% of enlisted personnel took lump sum
        - DOD employees forfeited $1.7 billion in PV

Themes, Causes and Designs

- **Hyperbolic Discounting -Current Consumption**
  - **Behavior Modification - Resolution to lose weight, quit smoking**
    - **immediate benefit unlike retirement**
    - **1 apple 100 days, 2 apples 101 days**
    - **1 apple today, 2 apples tomorrow**
      - **Consumption imagery**
  - **Role of (+/-) imagery in communication**

Hyperbolic Discounting

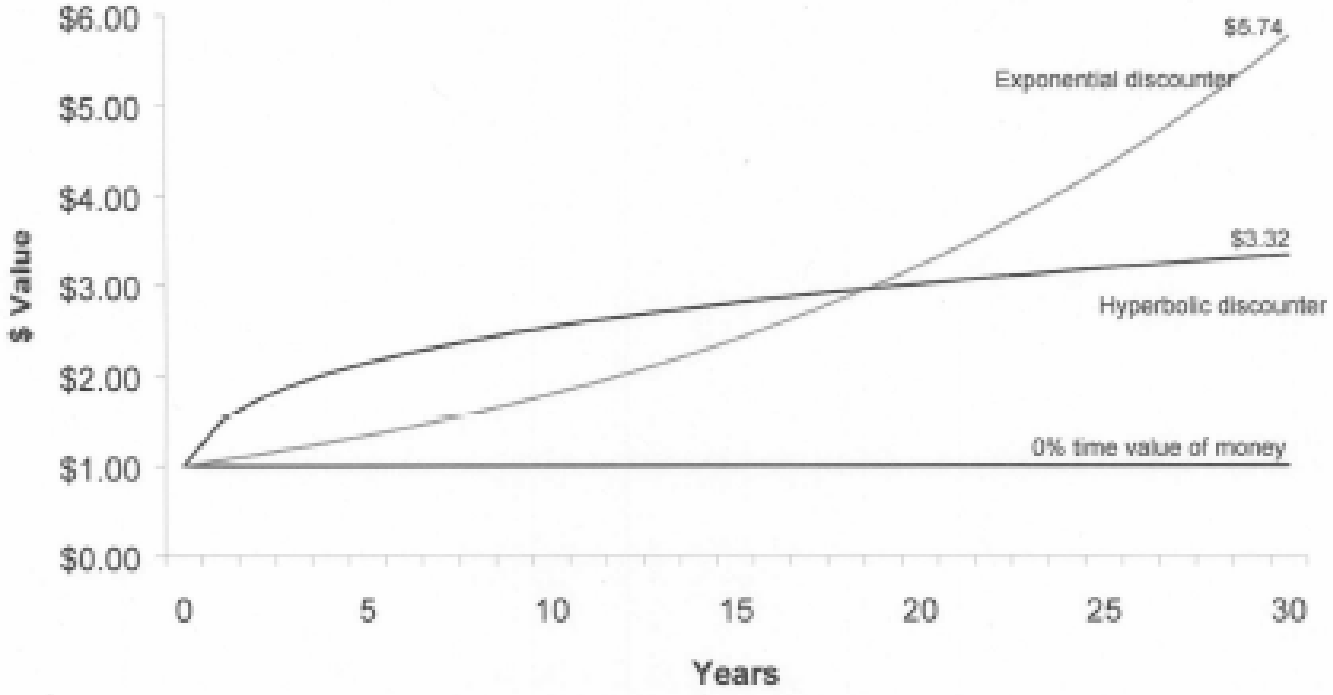


Figure 1. Exponential versus Hyperbolic Discounters: Growth of $1 Over Time

Source: Authors' calculations.

Themes, Causes and Designs

- **Affective/emotional decision making : older limbic system of the brain**
  - **Emotions gauge risk in two terms**
    - **Dread risk: catastrophe/disaster risk**
      - **(see appendix)**
    - **Uncertainty risk: generalized fear of the unknown**
  - **Few people have a palpable fear/of impending disaster for an underfunded future retirement**
- **Analytic: Cerebral layer, source of symbolic or conceptual processing**

Themes, Causes and Designs

- **Effective retirement saving behavior must join cerebral with limbic system**
  - **Else fear of poor retirement life ill suited in every dimension to elicit subjective feelings of risk**

- **Experience the threat of a poor retirement life by living on 2/3 or half one's income the next month or two**

- **Costs immediate/concrete, benefits distant/abstract**
  - **Immediate costs both affective/analytical,**
  - **distant benefits/ or costs only analytic**
  - **Negative, analytical judgment of risk has no impact**
    - **Failure to take action not frightening**

- **Counseling/therapy sessions**

Themes, Causes and Designs

- Role of education in saving
  - Type of education
  - The role of positive imagery
- Communication and education
  - The effect of peers
    - Choosing exemplary peer cohorts
    - Informal group leaders
    - Hardening of current consumption
  - Fear
    - Depression and savings
  - Greed
    - Anchoring, diversification and asset allocation
    - Financial demographics of savings

Themes, Causes and Designs

- **Expectations of and actuals of retirement lifestyle**
  - **Adequacy of savings**
  - **Receiving 401 K funds**
    - **Lump sum vs. Annuitization**
      - **Low Frequency of Annuitization – implications for successful planners**
  - **Change in lifestyle**
    - **Anticipated vs. actual changes**

Annuities and Retirement Well-Being

Relationship Between Retirement Satisfaction and Pension Annuity Ratio, by Income Category

Household Income	Percent Very Satisfied			Percent with Zero Depression Symptoms		
	Zero Pension Annuity Ratio	Median Pension Annuity Ratio (1-25)	High Pension Annuity Ratio (26-100)	Zero Pension Annuity Ratio	Median Pension Annuity Ratio (1-25)	High Pension Annuity Ratio (26-100)
Under $15,000	39.2	50.8	50.4	16.4	14.5	18.8
$15,000-30,000	54.5	62	62.4	24.8	23.4	23.8
$30,000-50,000	61.2	70.4	72.1	30.7	32.3	34.5
$50,000 or more	70.2	78.4	75.6	36.7	34.2	38.4

Annuities and Retirement Well-Being

Retirement Satisfaction and Depression Symptoms by Degree of Annuitization

	Retirement Satisfaction (%)			Number of Depression Symptoms(#)		
	Not at All	Moderate	Very	0	1-3	4- plus
By Social Security reliance:						
0-25	5.7	26.4	67.9	31.7	51.1	17.3
51-100	13.1	43	43.9	18.3	52	29.7
By pension annuity ratio:						
No pension	10.6	35.1	54.3	25.9	50.3	23.8
26-100	3.5	27	69.5	32.1	52.6	15.3

Themes, Causes and Designs

- **Anticipated and actual changes in retirement**
  - **Demographics of actual changes**
  - **Expectations**
    - **Maintaining living standards**
  - **Concerns**
    - **Health**
    - **Earning enough to afford expected standard of living**

DEMOGRAPHICS: Expected vs. Realized Spending

Percentage Change in Spending at Retirement, Weighted

	Expected Change among the Not Retired	Realized Change among the Retired
WEALTH QUARTILES		
Lowest	(19.5)	(21.8)
Highest	(17.0)	(6.7)
INCOME QUARTILES		
Lowest	(17.6)	(21.2)
Highest	(20.3)	(8.0)
EDUCATION		
Less than High School	(10.8)	(15.5)
High School Graduate	(21.9)	(14.9)
College or more	(19.0)	(8.0)
STOCK OWNERSHIP		
Owners	(19.1)	(8.7)
Not Owners	(20.8)	(17.0)
SELF-RATED HEALTH		
Excellent	(18.3)	(9.0)
Poor	(21.4)	(26.1)

Themes, Causes and Designs :

- **Expected and actual changes**
  - **in retirement lifestyle**
    - **Production of home based products**
      - **Education/communication material**
    - **Consumption**
    - **By Gender**

Table 11: Importance of home production: Evidence from Time-Use Data for Respondents aged 60-64, weighted responses

	Hours per week			
	Males 60-64		Females 60-64	
N				
Possible substitutes				
House cleaning	2.88	3.16	5.80	7.25
Washing/ironing	1.03	1.14	3.56	3.91
Yard work/gardening	2.10	4.07	1.48	2.10
Shopping	3.16	3.41	3.86	4.74
Meal preparation	3.46	4.51	7.42	9.34
Money management	0.78	0.84	0.89	0.86
Home improvements	0.88	2.32	0.75	0.74
Total	14.29	19.45	23.76	28.94
Possible complement				
Concerts/movies	0.72	0.32	0.27	0.25
Work for pay	34.62	5.65	31.73	1.73
Observations	*88-90*	*176-179*	*153-155*	*250-255*

Table 12: Importance of home production: Evidence from Time-Use Data for Respondents aged 65-69, weighted responses

	Hours per week			
	Males 65-69		Females 65-69	
	Not retired	Retired	Not retired	Retired
Possible substitutes				
House cleaning	1.78	3.21	5.39	6.90
Washing/ironing	1.05	0.92	3.40	3.30
Yard work/gardening	2.05	4.97	2.26	2.26

Table 13: Change in hours per week associated with retirement, weighted responses

	Males		Females	
	60-64	65-69	60-64	65-69
Substitutes	5.16	9.20	5.18	0.89
Complement	-0.40	0.23	-0.02	0.08
Work for pay	-28.97	-30.04	-30.00	-24.24
Possible dollar saving	2,683	4,784	2,694	463

Note:

"dollar saving" (annual) from evaluating substitute hours at $10 per hour.

Total household spending for this age group from CEX: about $35,000.

Adding males & females as approximation for household saving from home production:

15.4 % for 60-64 year-olds

15.0 % for 65-69 year-olds

Future Plan Design

The AgeBander Model

www.agebander.com

Age-Banding: A New Model

- The Old “Traditional” Model: Is it broke?

The Retirement Objective

- The need to maintain our standard of living during retirement
- Time horizon typically backed out of the mortality tables and client-specific information
- Risk-return subjectively dependant on clients

Traditional View: Weaknesses

- Replacement ratio: (e.g. 40-90%)
  - No formal model to compute this ratio
  - Conservative – Aggressive
- Assumes expenses during retirement increase at the inflation rate
  - Leisure/Healthcare inflation app 6%

Traditional View: Weaknesses

- Investment horizon & allocation
  - Single basket
- Risk management
  - Choice of securities
- Incorporating Long Term Care, etc.
  - Inflexible

Alternate View

- Retirement is dynamic
  - No different from any other stage of life
- Typical observations
  - Leisure spending to healthcare spending
  - Life-cycle dynamics

The Age-Banding Model: Case Studies

- Case 1 : The Smiths
  - Individual and spouse
    - Both around 60 years
  - Expect to retire in 5 years
  - Expect to live in retirement *for about* 30 years
- Case 2: Ms. Jones
  - 35 year old individual
  - Single, mid-career

Assess both cases by traditional method and by alternate method of planning

Traditional View:

Compute cost of living immediately prior to retirement

Alternate View:

Same as above but segregate costs into basic living costs, taxes, leisure and healthcare expenses

Case 1: The Smiths
Pre-retirement Expenses

Cost of Living at Age 60 (Today)

Taxes	28,000
Basic Living	36,000
Health Care	6,000
Leisure	5,000
Total	75,000

Cost Projections: Traditional

Traditional View				
	Costs at Age	5 Yr. Growth & Inflation Rate	Multiply by factor	Costs at Age
	60			65
Total	75,000	3%	1.159	86,945

All expenses are expected to grow at the long term rate of inflation

***Assumed as 3% in this example**

Cost Projections: Alternate

Table2B: Alternate View				
	Costs at Age	5 Yr. Growth & Inflation Rate	Multiply by factor	Costs at Age
	60		Table 1	65
Taxes	28,000	3%	1.159	32,460
Basic Living	36,000	3%	1.159	41,734
Healthcare	6,000	6%	1.338	8,029
Leisure	5,000	6%	1.338	6,691
Total	75,000			88,914

Taxes and Basic Living Expenses increase at 3%/Yr.
Healthcare and Leisure expenses increase by 6%/Yr.

Assumptions

- Traditional : Assume RR factor = 80%
- Traditional : Inflation Rate of 3%
- Alternate: Life Cycle Factors
  - Factors proxy lifestyle changes during retirement
  - Factor values around 1
  - Factor adjustments made at discrete intervals
  - Example of factor values
- Alternate: life cycle changes at ages 65/75/85

Example – Factor values at Age 65

Category	Value	Notes
Taxes	0.75	FICA- *Average tax rate* Client specific
Basic Expenses	0.70	Mortgage paid off
Healthcare	1.05	Aging
Leisure	1.5	Postponed increases

Factor values during retirement – multiple replacement ratios

Life Cycle factors			
Age	65	75	85
Taxes	0.75	1	1
Basic Living	0.7	0.8	0.9
Healthcare	1.05	1.1	1.15
Leisure	1.5	0.5	0.25

Replacement Ratios

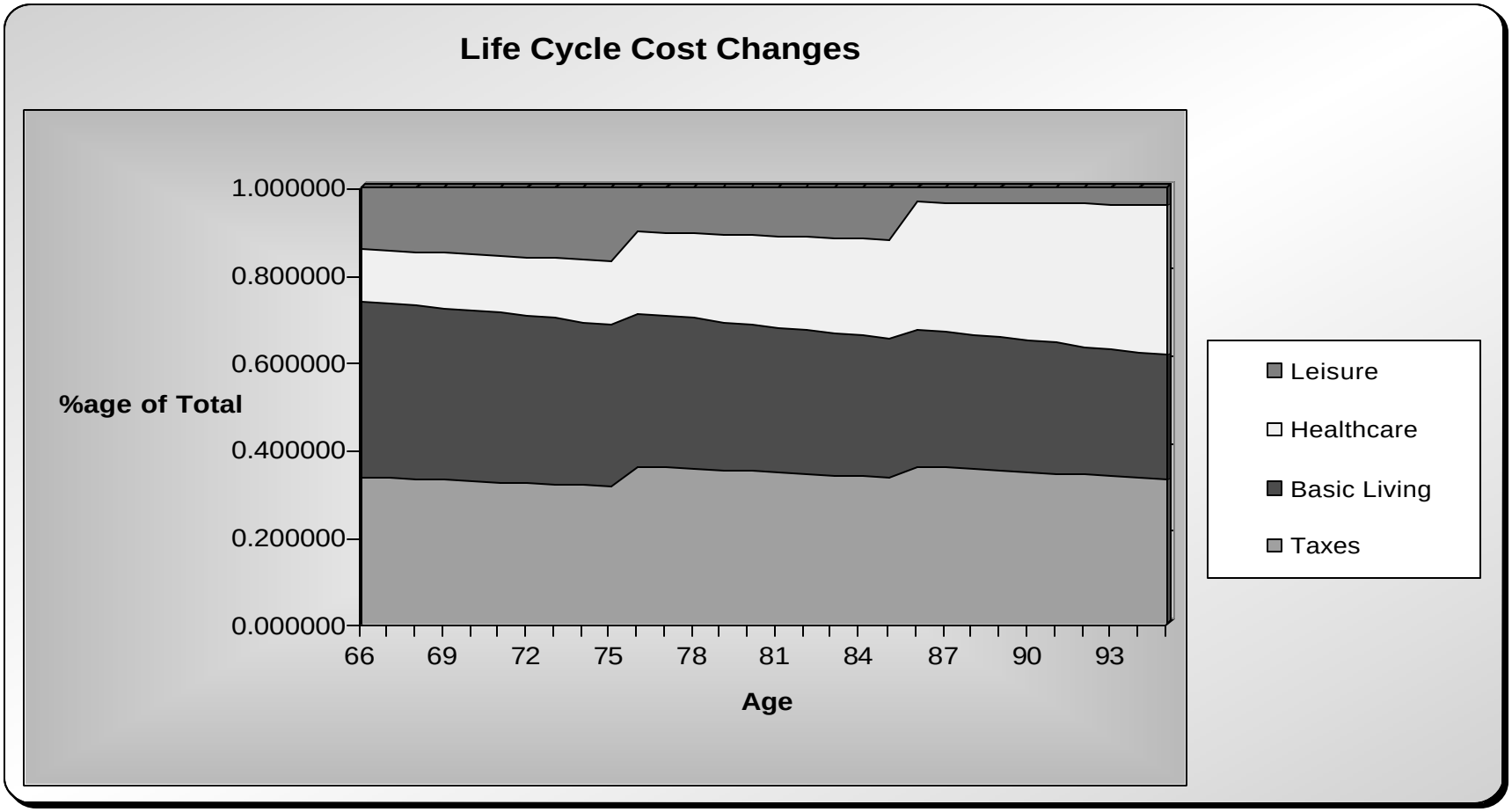
Table 3A: Alternative Traditional View			
Total	86,945	0.8	69,556

Table 3B: Adjustments Alternate View			
	Pre- retirement	*Post*- retirement	*Post*- retirement
	Costs at Age	LifeCycle factor	Cost at Age
	65	at Age 65	66
Taxes	32,460	0.75	24,345
Basic Living	41,734	0.7	29,214
Healthcare	8,029	1.05	8,430
Leisure	6,691	1.5	10,037
Total	88,914		72,026

Comparison of Projections

	Cost comparisons Between Methods					
	66	75	76	85	86	95
Traditional	71,643	93,478	96,282	125,627	129,395	168,832
AgeBander	74,741	105,051	93,181	132,450	125,321	179,252
	-4.14%	-11.02%	3.33%	-5.15%	3.25%	-5.81%

Alternate Chart: Component Costs



Traditional: Retirement Fund

Table 5A: Traditional View of Expense Projection and Funding Requirements					
		Amount		Amount	Amount
		Needed At Age		Needed At Age	Today (Age 60)
Post retirement need	69,556	65	1,470,072	60	1,124,803
Increases annually at	3.0%				
Safe Investment at	5.5%				

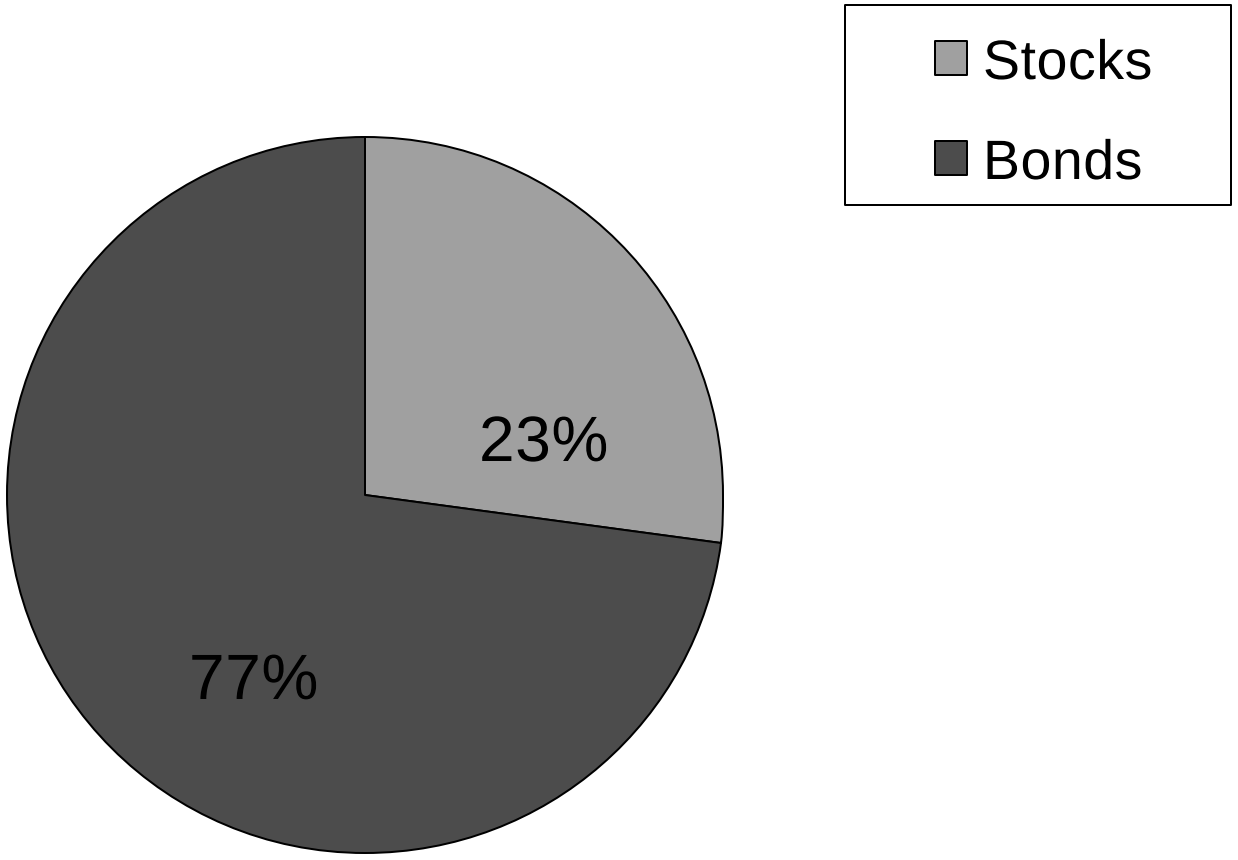
Alternate: Funding Requirements

- Expenses recorded separately for 3 decades
  - (66-75, 76-85, 86-95)
    - 3 dedicated portfolios.
    - Differential returns :
      - 5.5%, 7% and 8%
      - for 5, 15, 25 year portfolio
- Retirees are more risk averse than others
  - A circuit breaker for risk
    - 5 year cushion

Alternate: Retirement Fund

Alternate View						
	Amount		Earnings		Amount	Amount
	Needed At		Rate	Factor	Needed At	Today
Today	60	480,923		1.000	60	480,923
10 Yrs Later	70	602,027	0.08	0.463	60	278,855
20 Yrs Later	80	813,119	0.10	0.149	60	120,865
Total						880,643

Asset Allocation



Comparative Analysis

Required funds at 60

- Traditional 1,124,803
- Alternate - 880,643
  - Excess $ 244,160

A saving of nearly 22% today (at age 60)!!

Case Study 2: Ms. Jones

What would the impact be for a 35 year old?

Case Study 2: Ms. Jones

- Assume (simplifying) that the same retirement expenses are projected
  - 3 portfolios
    - - 30 year – 8%
    - - 40 year – 10%
    - - 50 year – 12%

Individual has 50 years for managing portfolio

Case 2: Comparative Analysis

Table 7A: Contributions-Traditional View				
Amount	At			
Needed	Age		Exp Rate	Annual Contributions
30 Yrs Later	65	3,078,005	0.08	$27,171
Table 7B: Contributions-Alternate View				
30 Yrs Later	65	1,753,455	0.08	$15,479
40 Yrs Later	75	2,249,987	0.1	$5,084
50 Yrs Later	85	3,126,524	0.12	$1,303
Total				$21,865

Case 2: Comparative Analysis

Savings rate on contributions

A savings of about

20% today !!

Risk Analysis

Table 8: Risk Analysis

Ms. Jones	Bonds	Large Caps	Small Caps	P'fol Risk
Traditional View	0	100%	0	20.10%
Alternate View	0	85%	15%	21.30%
The Smiths				
Traditional View	100%	0	0	9.20%
Alternate View	73%	27%	0	9.44%

Risk Analysis: Ms. Jones

Abs. Risk Increase = 1.2%

Contribution Reduction = 20%

Benefit today

Time to manage risk = 50 years

Risk Analysis: The Smiths

Risk Increase = 0.24%

Contribution Reduction = 22%

$244,000 Savings

Time to manage risk = 25 years

Risk Analysis: 60 year old couple

- Additional risk considerations
  - 5 year safety cushion
  - First 10 years risk free – same as traditional
  - More precise expense estimation mitigates risk
  - Buy two $50,000 (from savings) of fixed income securities with maturities of 15 and 25 yr. – **BEHAVIOR issues**
    - Most of the risk increase goes away

Generality of Model

- Income netting:
  - Social security
  - GACs (risk adjusted), etc.
- Point estimates:
  - Estimate of effects of inflation, returns, etc can be made using range estimates rather than single point estimates
  - Introduce additional statistical analysis

Generality of Model

- Life cycle decades & expenses
  - Any time span (1 year, 5 year, etc can be used)
    - Continuous time modeling
- Breakup expenses (e.g. healthcare) into component costs for further fine – tuning
- Time Long Term Care policy benefits to various phases of retirement

In behaving ourselves .....
for retirement