Retirement Economics

William F. Sharpe

Pensions & Investments
Defined Contribution 401(k) Conference

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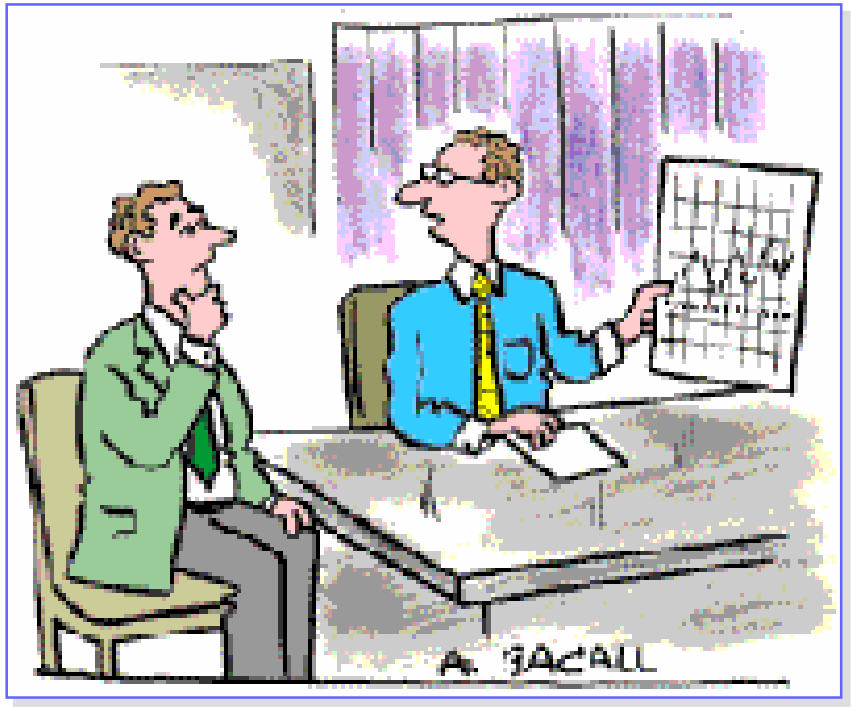
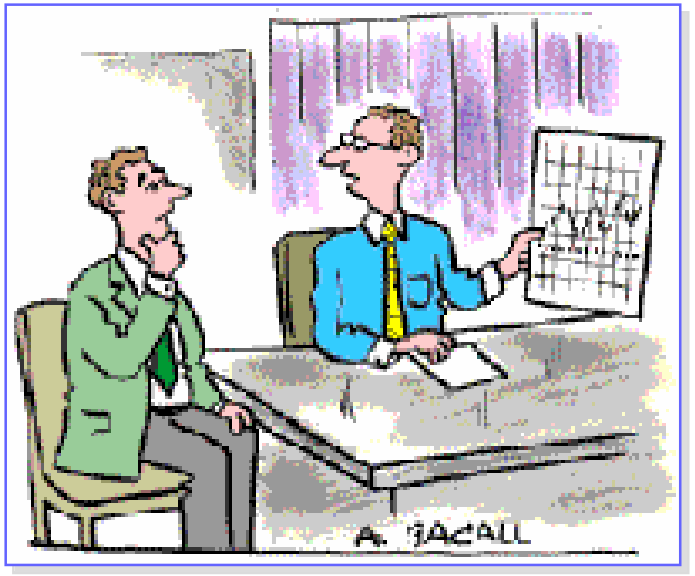
Theory

Practice



Theory and Practice

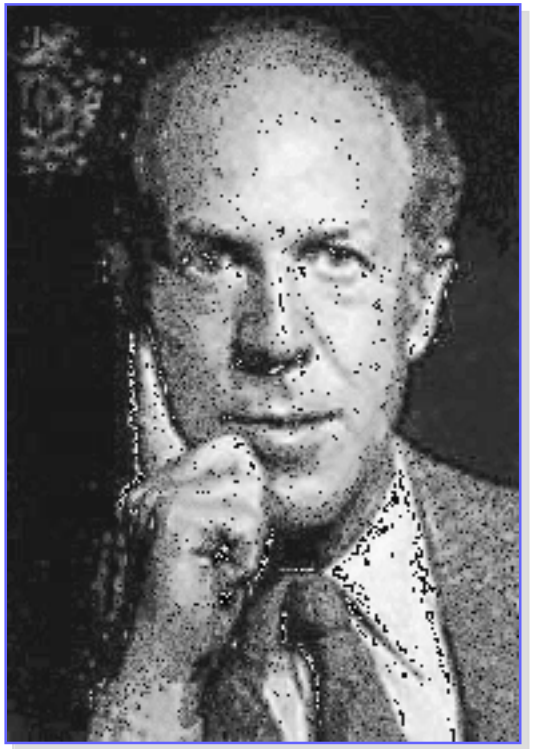


Some “Impractical” Theories that became Practical in time

- Markowitz’ Portfolio Theory
- The Capital Asset Pricing Model
- Binomial Option Pricing
- Optimization and Monte Carlo Forecasting for Personal Investment Advice

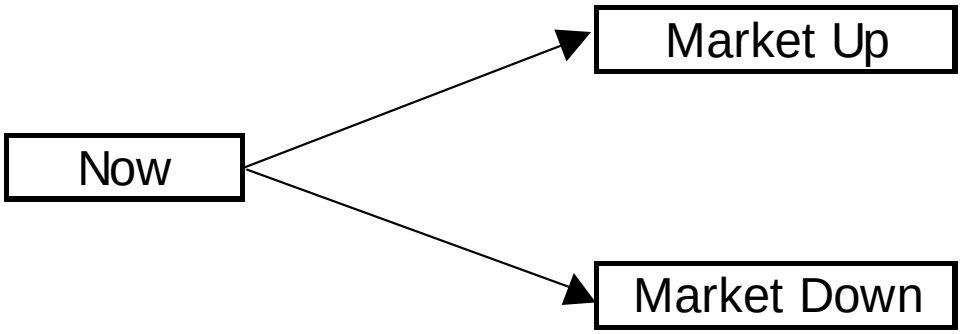
State Preference Theory

Kenneth Arrow

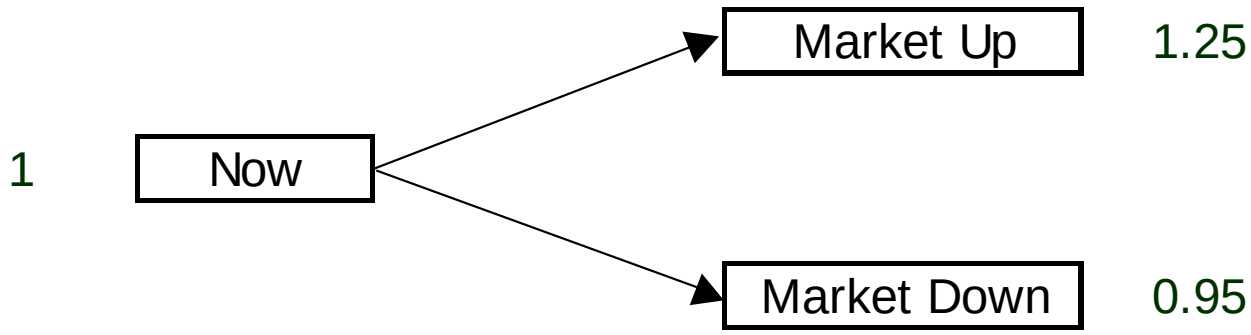


Gerard Debreu

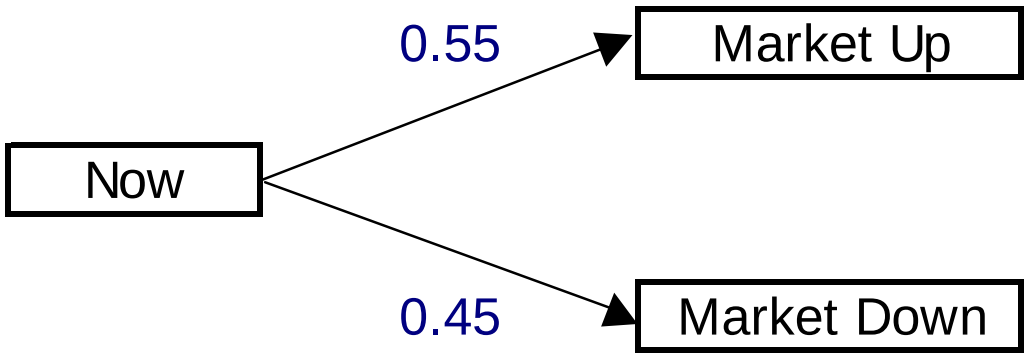
States



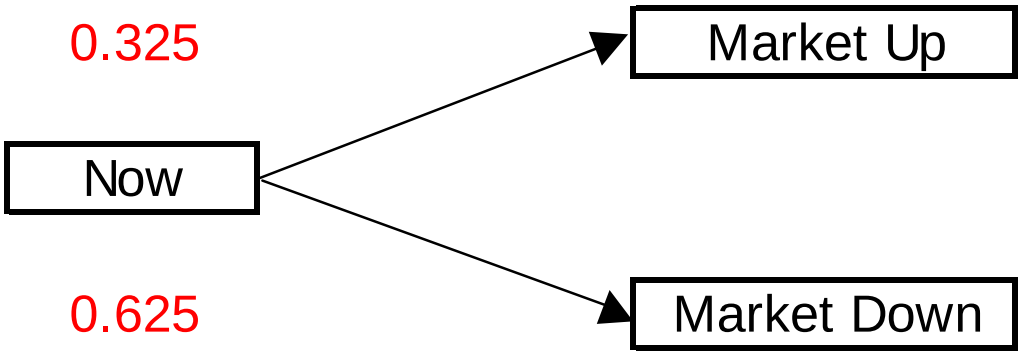
Spending



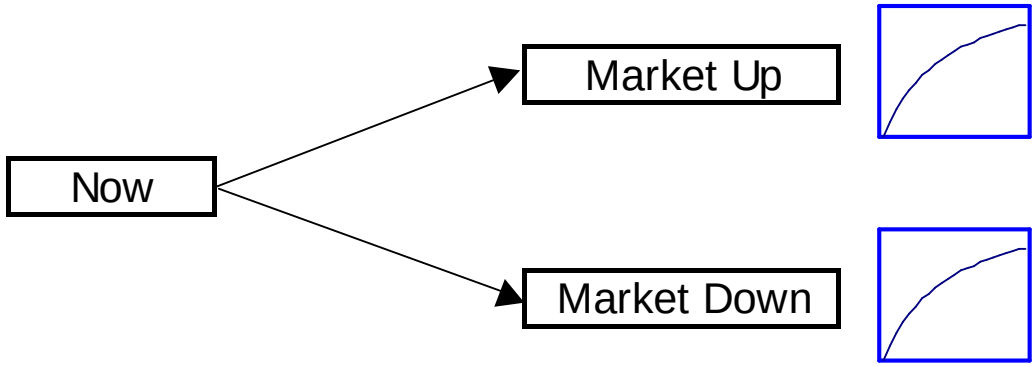
Probabilities



Prices



Utilities



Expected Utility

- Utility (U) = Happiness
- Expected Utility (EU) = Expected Happiness
- EUs = Probs * U($s)
- EU = Sums(EUs)

The Goal

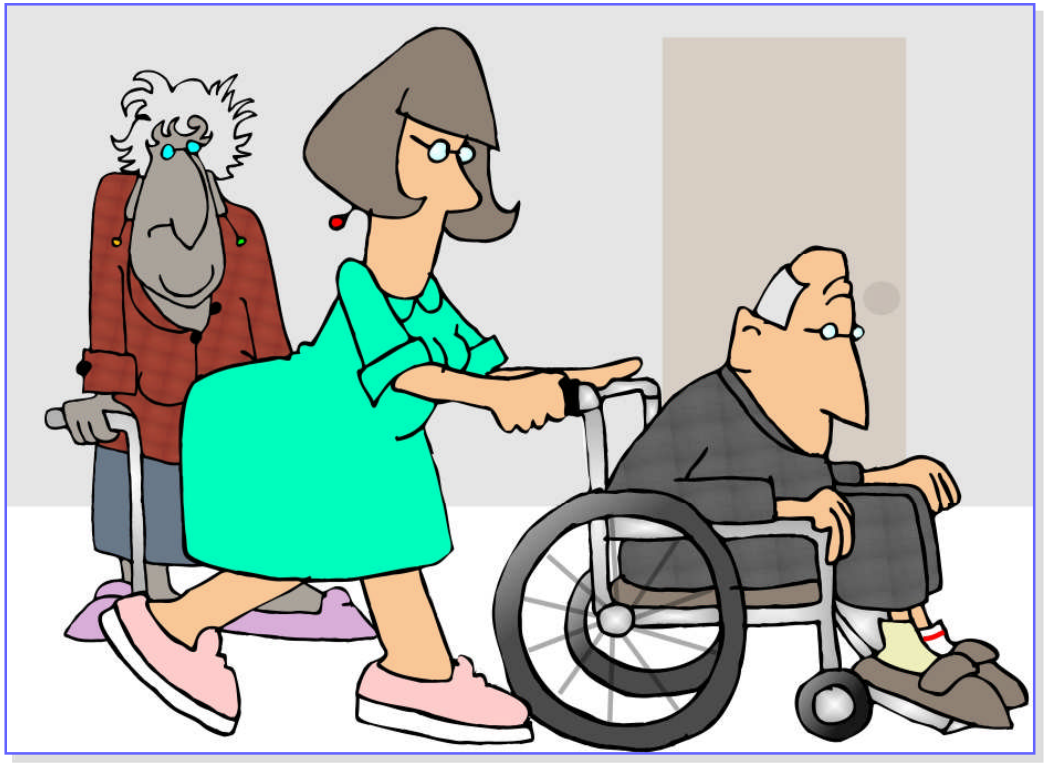
- Choose Spending in states ($s)
- To Maximize expected utility Given:
  - State prices
  - Probabilities
  - Investor's total wealth

What makes Retirement Economics different from Pre-retirement Economics?

Personal States

Well

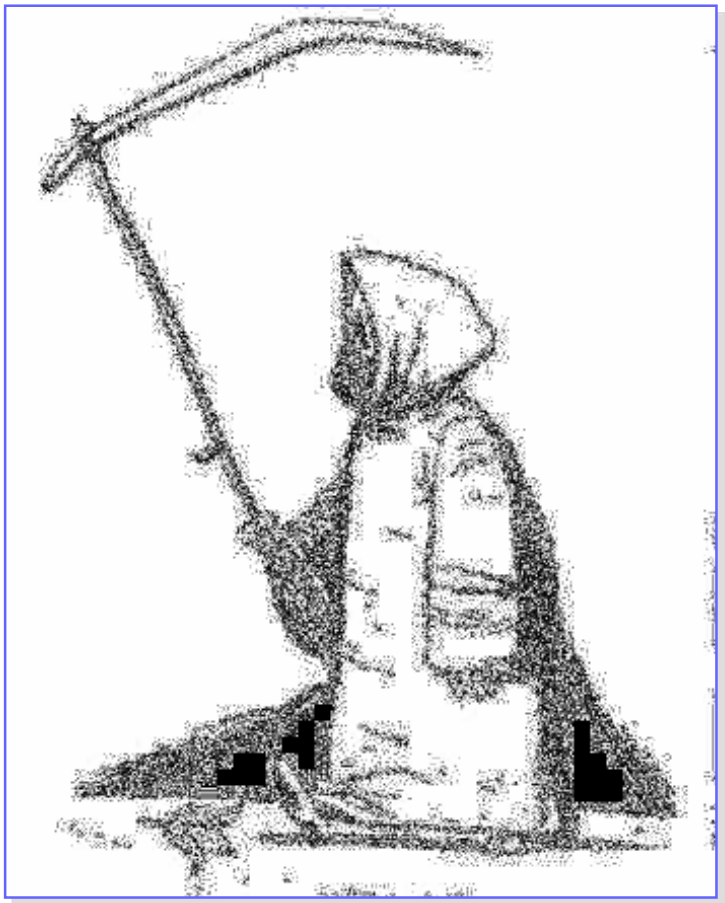
Sick



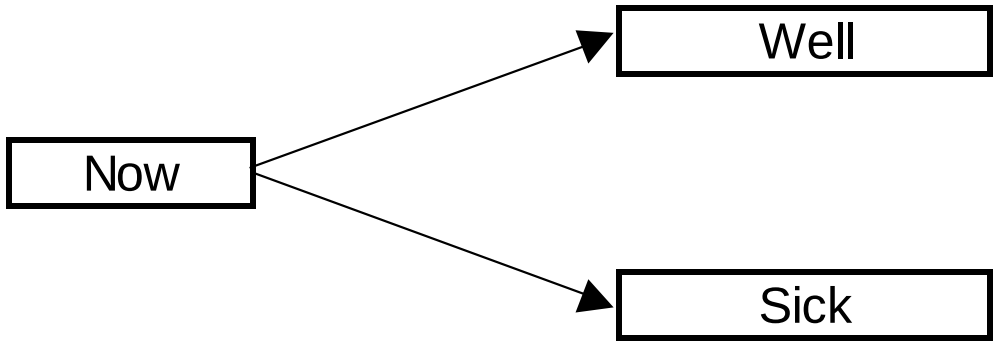
Long-term Care Eligibility

- Within the last 12 months an independent licensed health care practitioner has certified a need for either Hands-on or Stand-by Assistance from another person to perform at least two out of the six “Activities of Daily Living,” for an expected period of at least 90 days due to a loss of functional capacity.
- The six activities of daily living are:
  - Bathing
  - Dressing
  - Toileting
  - Transferring
  - Continence
  - Eating

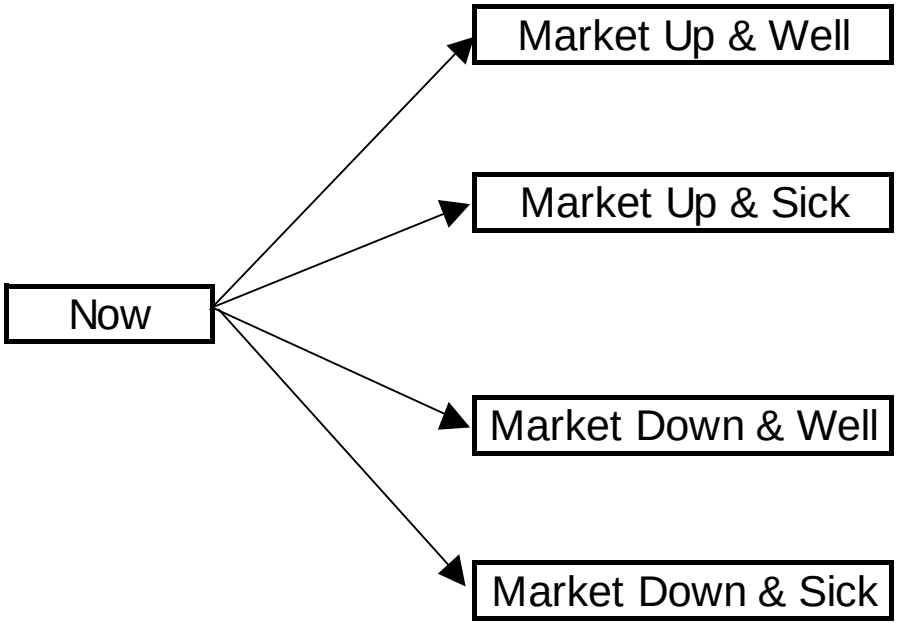
Dead



Personal States



All States


Now
Market Up & Well
Market Up & Sick
Market Down & Well
Market Down & Sick

State-Dependent Utilities

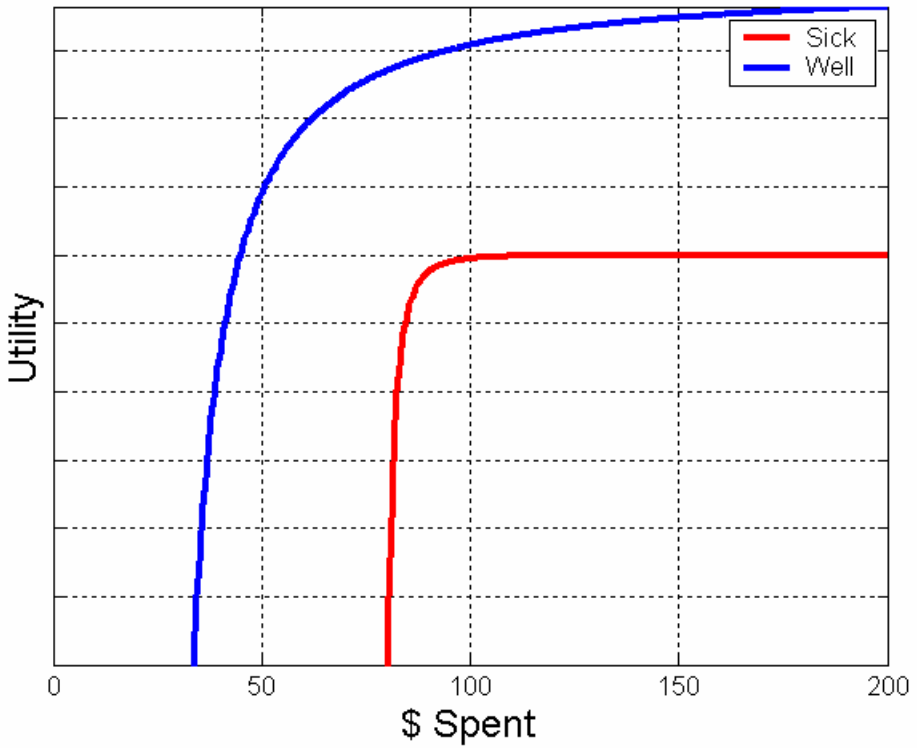
Well

Poor

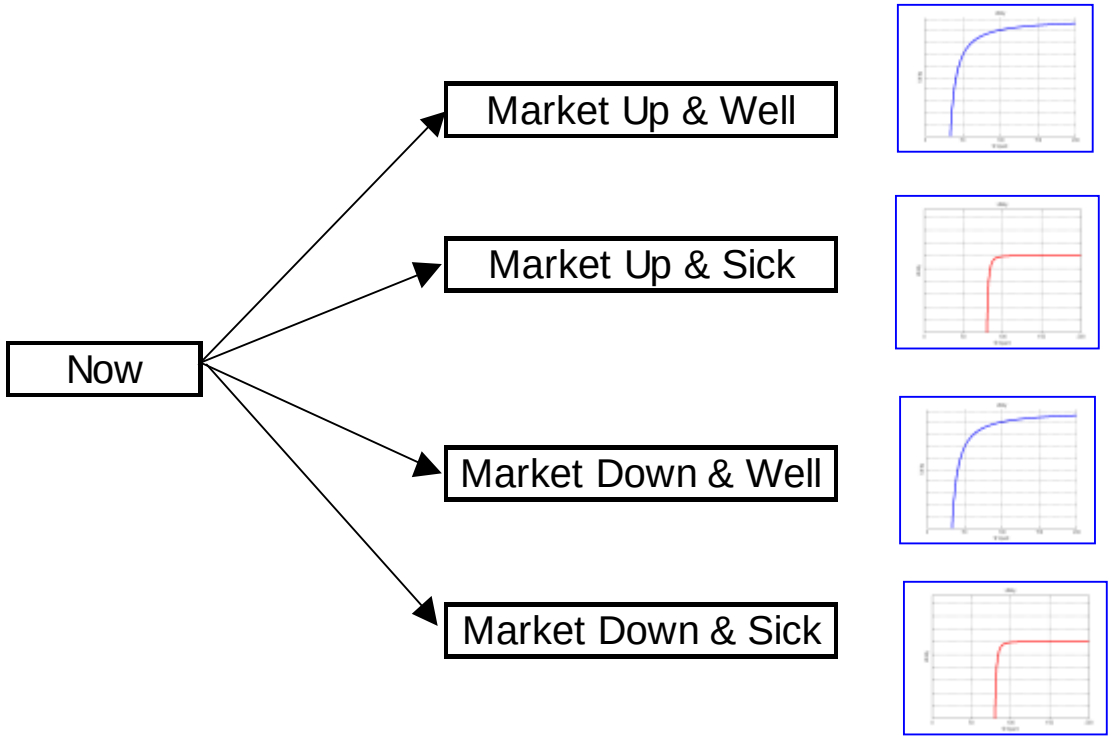
Rich

Sick

State-Dependent Utilities



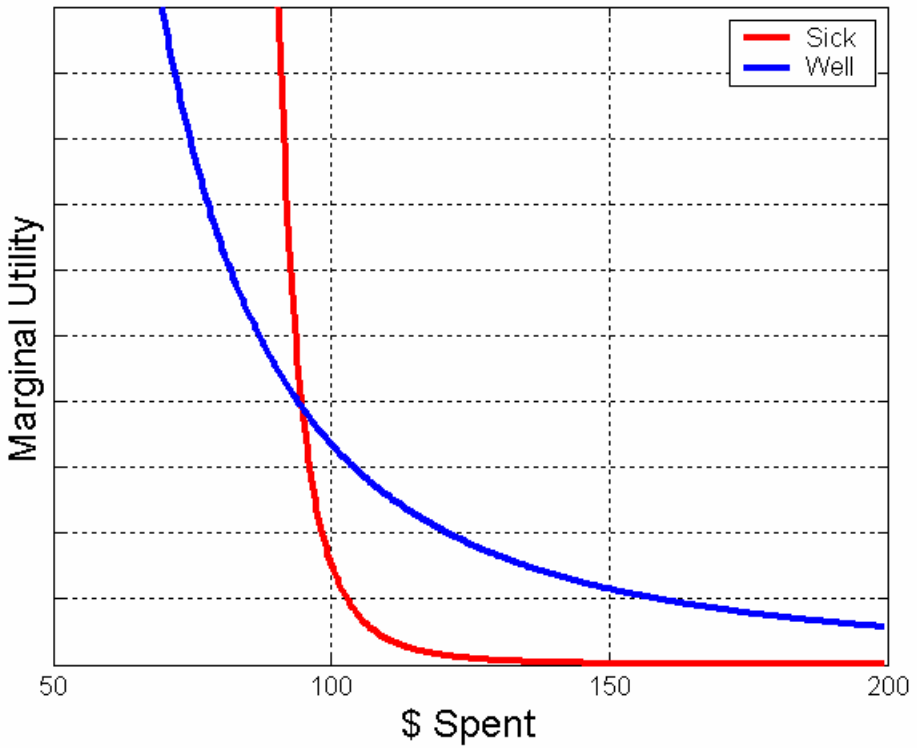
State-Dependent Utilities



Optimal Budget Allocation

- Condition for optimal allocation
  - Moving $1 of spending from state *a* to state *b* (or vice-versa) will not increase expected utility
- Depends on:
  - Prices
  - Probabilities
  - Marginal Utilities
- Marginal utility:
  - Change in utility if spending is increased by $1

State-dependent Marginal Utilities



An Example: New Insurance and Investment Products

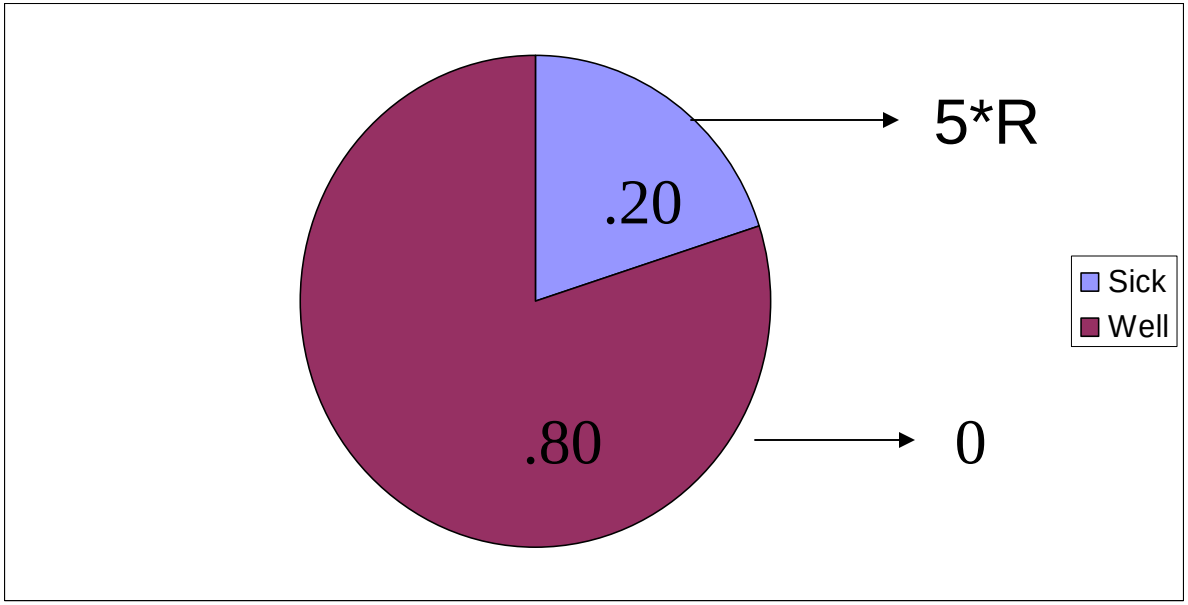
Insurance

$1 today → $ k*R Next Year

If condition is fulfilled

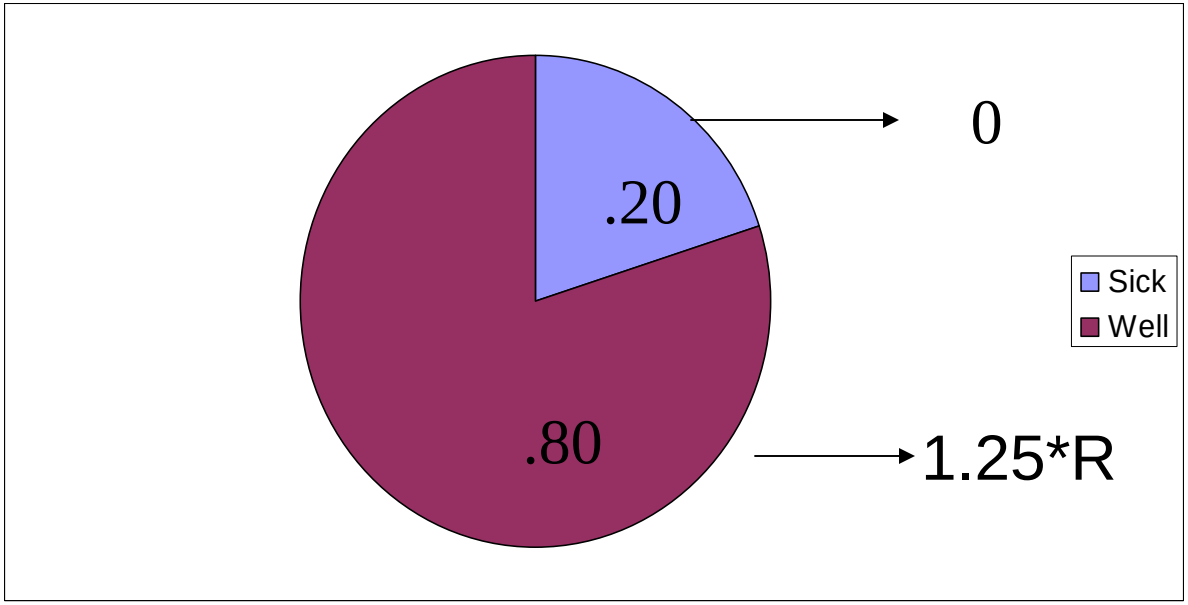
- Fixed: R = return on riskless bonds
- Variable: R = return on stocks
- k: based on probability of condition

Sick Insurance



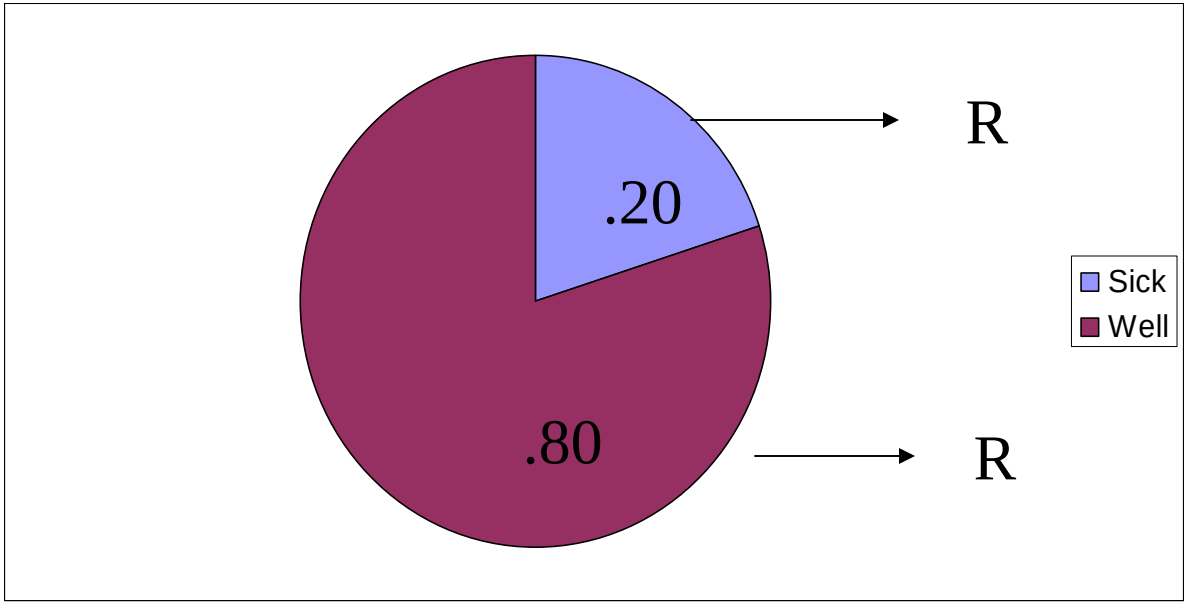
Probability Sick = 0.20

Well Insurance



Probability Well = 0.80

Mutual Fund



Mutual Fund =

$0.20 Sick Insurance

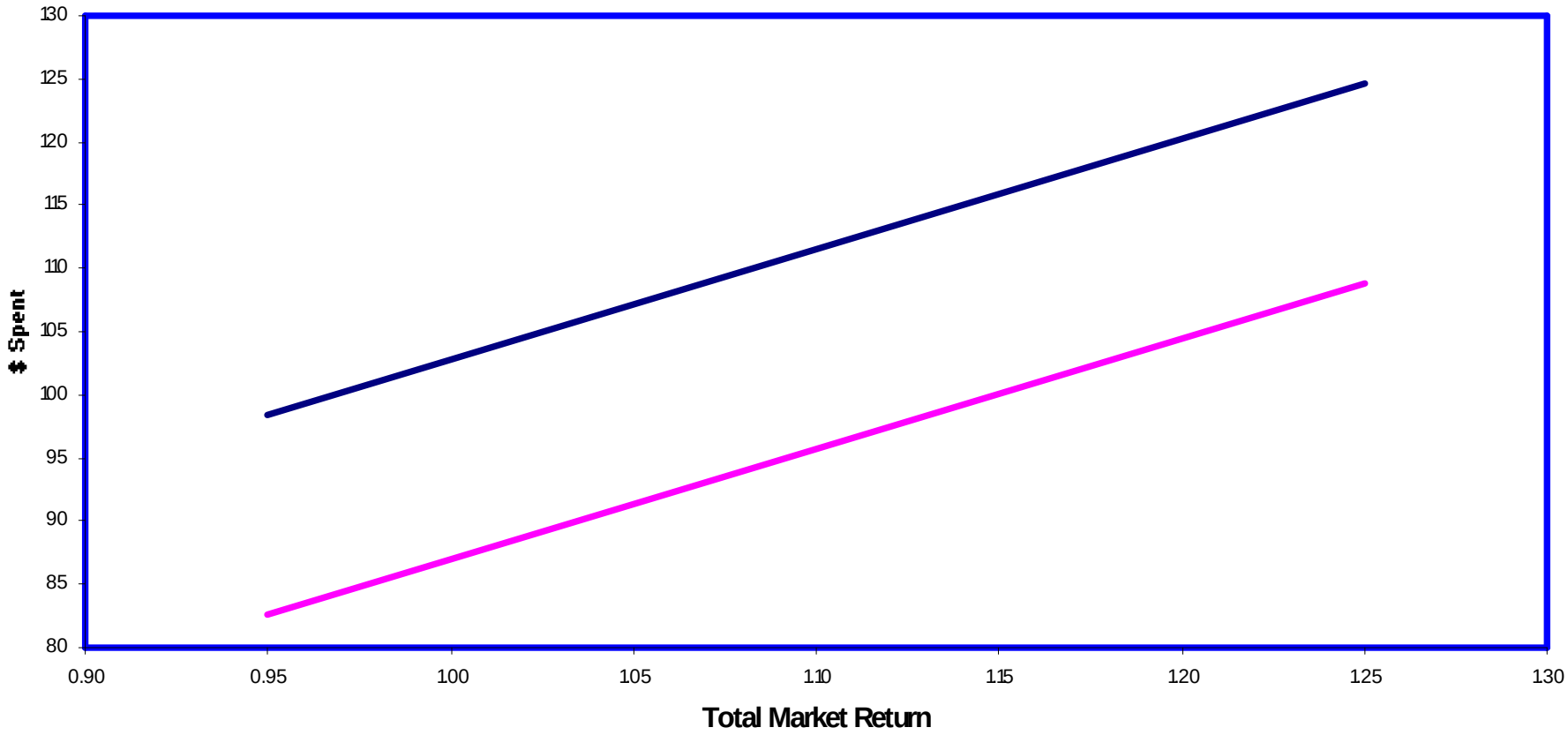
+

$0.80 Well Insurance

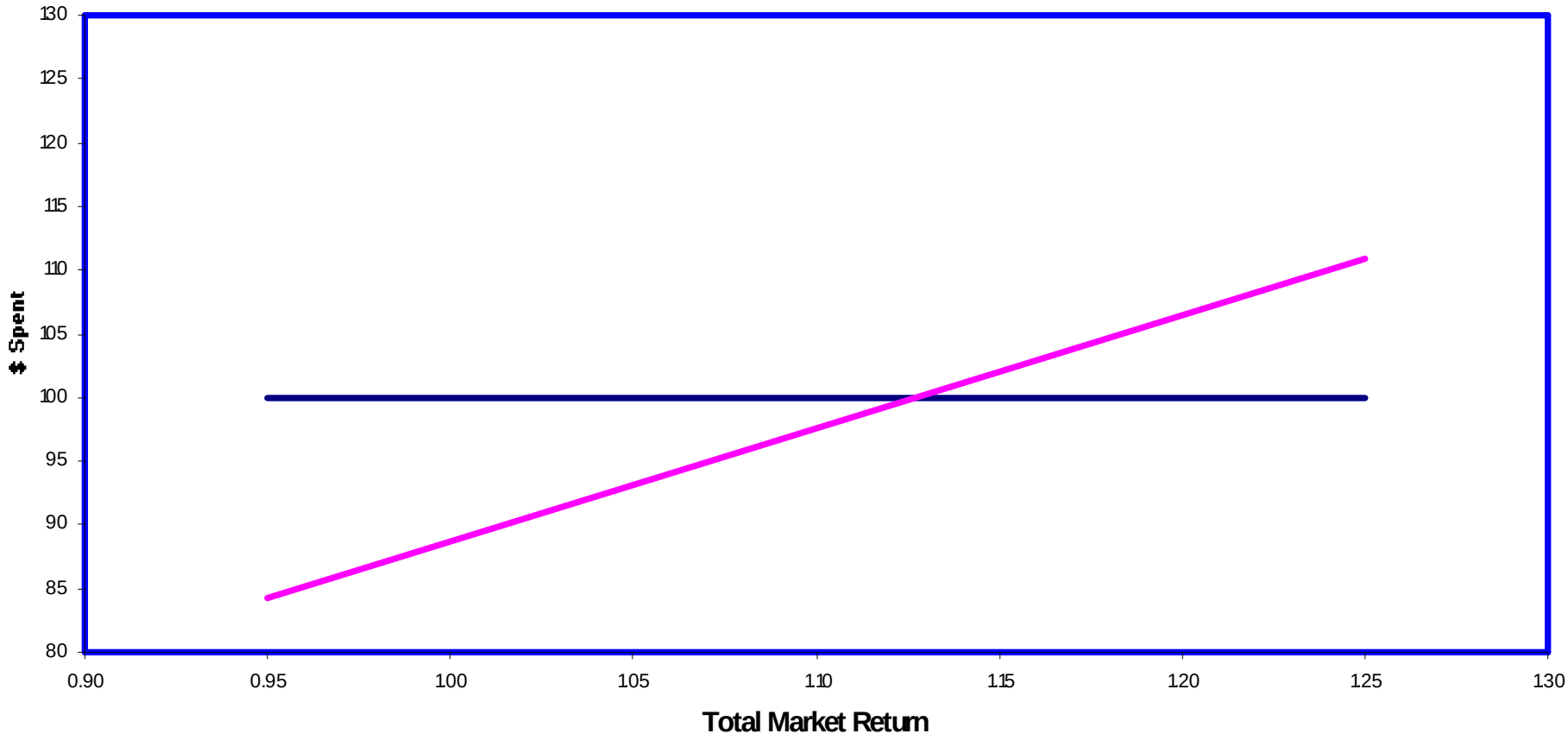
Available Products

	Fixed	Variable
Sick Insurance		
Well Insurance		
Mutual Fund		

Mutual Fund + Sick Insurance



Sick Insurance + Well Insurance



Retirement Economics: From Theory to Practice

Problems and Solutions (1)

- Dimensionality
  - Better programs
  - Better computers
- Insufficient investor knowledge
  - Better education
- Investor preferences difficult to determine
  - Better communication
  - Better framing

Problems and Solutions (2)

- Insufficient financial products and services
  - More and better products and services
- Optimization is impossible
  - But improvement is possible and valuable