

Goal-Driven Investing

LDI for Households

San Francisco,
March 8, 2011

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Process

- Households allocate funds to investment accounts with varying tax treatments

Fund Strategy

- Long-only allocation to cash, stocks and nominal bonds

Mandate

- Grow nominal wealth subject to control on absolute volatility

Academic Basis

- Markowitz and Sharpe

Investment Plan

- Driven by risk tolerance or return need

Can we learn from institutional practice? One possible answer

Liability-Driven Investing

Idea

- Jointly construct the asset and liability portfolios so that their risk characteristics are matched

Definition

- Liabilities represent both **financial liabilities** plus the **goals** for the household

Rationale

- If the assets and liabilities are matched then the difference (surplus/deficit) is likely to be small and remain small over time

Goal Driven Investing: LDI for Household Investors

Aspects	Better Approach
Aim	Focus on attaining lifetime sustainable income and consumption <ul style="list-style-type: none"> • Beat the S&P 500 or afford your lifestyle and mortgage?
Framework	Lifecycle investing, consumption smoothing
Academic basis	Samuelson and Merton
Rationale	Rational investor will invest in risky asset to maximize lifetime utility of consumption
Construction	Asset allocation to hedge life risks, not just portfolio risks
Investment Plan	Risk Capacity (household capacity to bear risk)

Institutional
Liability-Driven Investing

Pension Funds Endowments
Insurance companies



Household
Goal Driven Investing

You and Me

Intuitive in theory, but difficult in practice

Consideration	Example
Capacity to manage liabilities and assets	<ul style="list-style-type: none">• Range of possible values in home purchase• Choice of school and university (public or private) local or distant
Flexibility in timing of cash flows	<ul style="list-style-type: none">• Mortgage debt type and terms• Lifestyle choice
Non-marketable assets	<ul style="list-style-type: none">• Human capital (employment)• Real estate and property• Social security income
Tax Implications	<ul style="list-style-type: none">• Nontransferable assets (tax loss carry forwards)• Asset location between taxable and non-taxable portfolios
Options for risk management	<ul style="list-style-type: none">• Health, life and disability insurance• Long-term care insurance

We must:

**Inventory the
Household
Balance Sheet**

- Liabilities
- Assets

Analyze

- Capacity for risk bearing
- Nature of risk exposures

**Manage the
portfolio**

- Tax and risk efficiently

In the household context, liabilities

Include both financial liabilities and goals, and both can be managed

Include both contractual (e.g., mortgage payments) and self-imposed (e.g., purchase vacation home) items

Represent the benchmark for optimization; goal structure defines investment risk and exposures

Are prioritized and defined in tranches

Controllable spending

Essential spending

Low Priority

Medium Priority

High Priority

Liabilities

Benchmark

Commitments

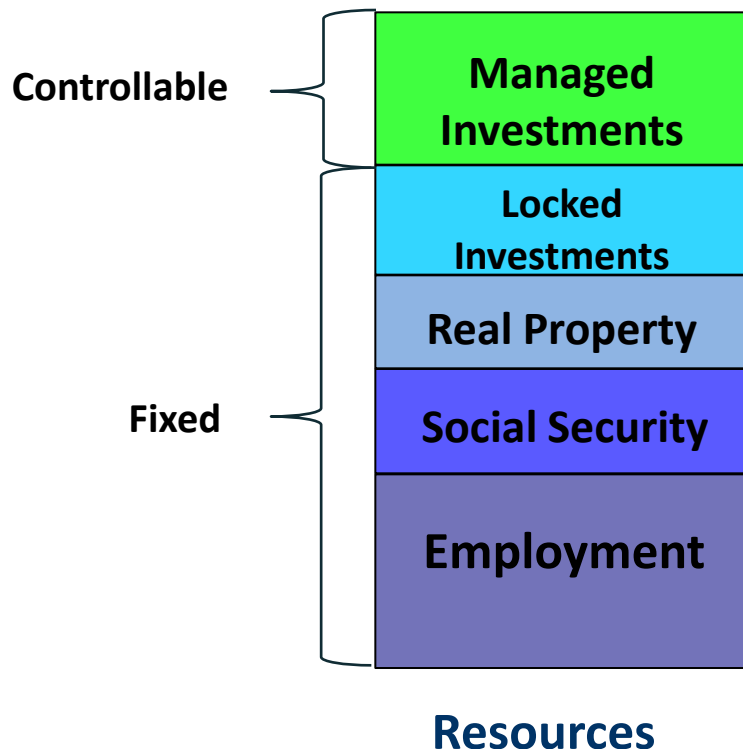
To prevent confusion, in the household context refer to them as Commitments

Assets should include everything that can be used to fund the Commitments and affect risk characteristics:

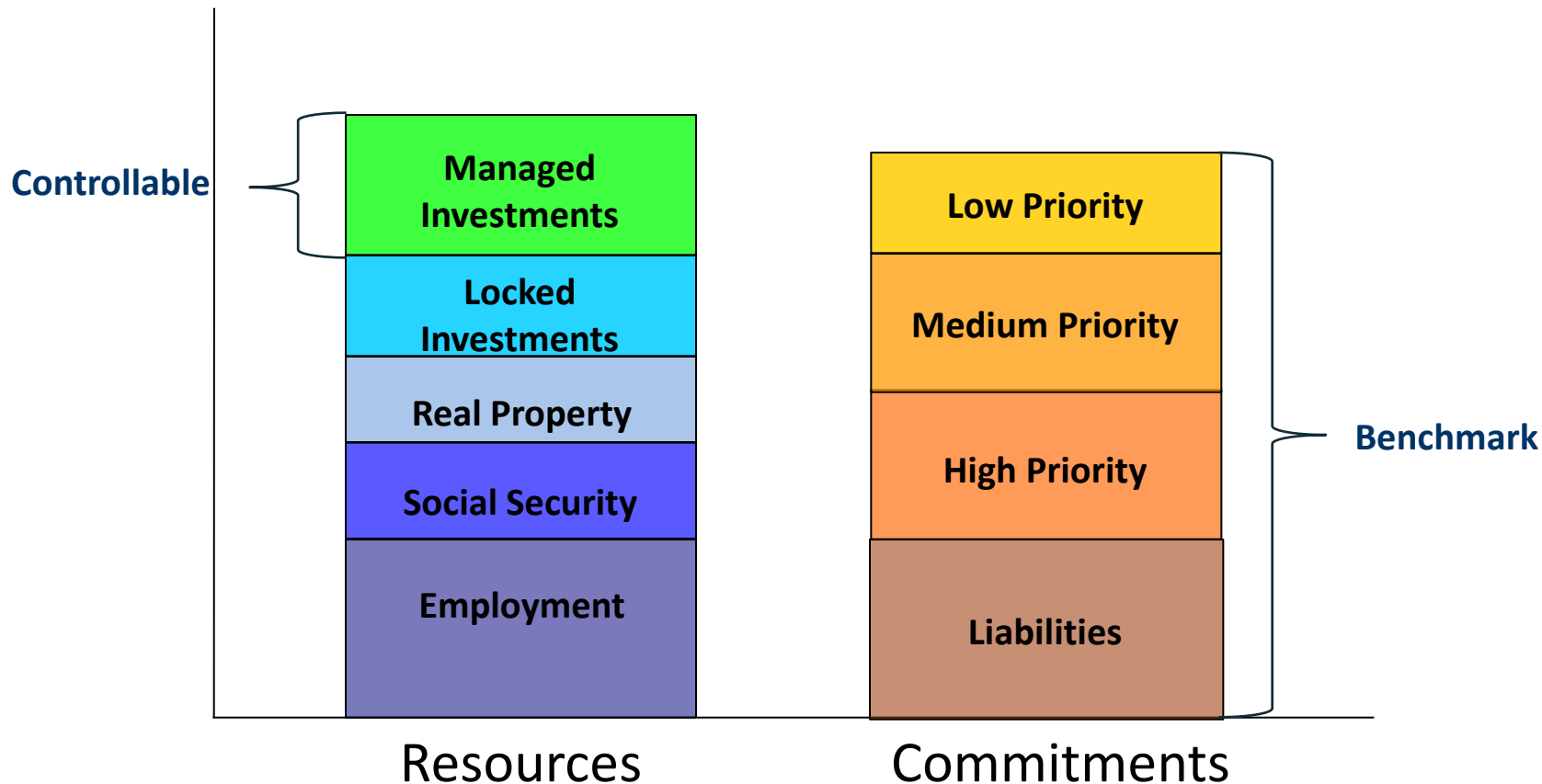
Requires comprehensive inventory

Includes employment income, social security, real assets such as a home, as well as savings and financial assets

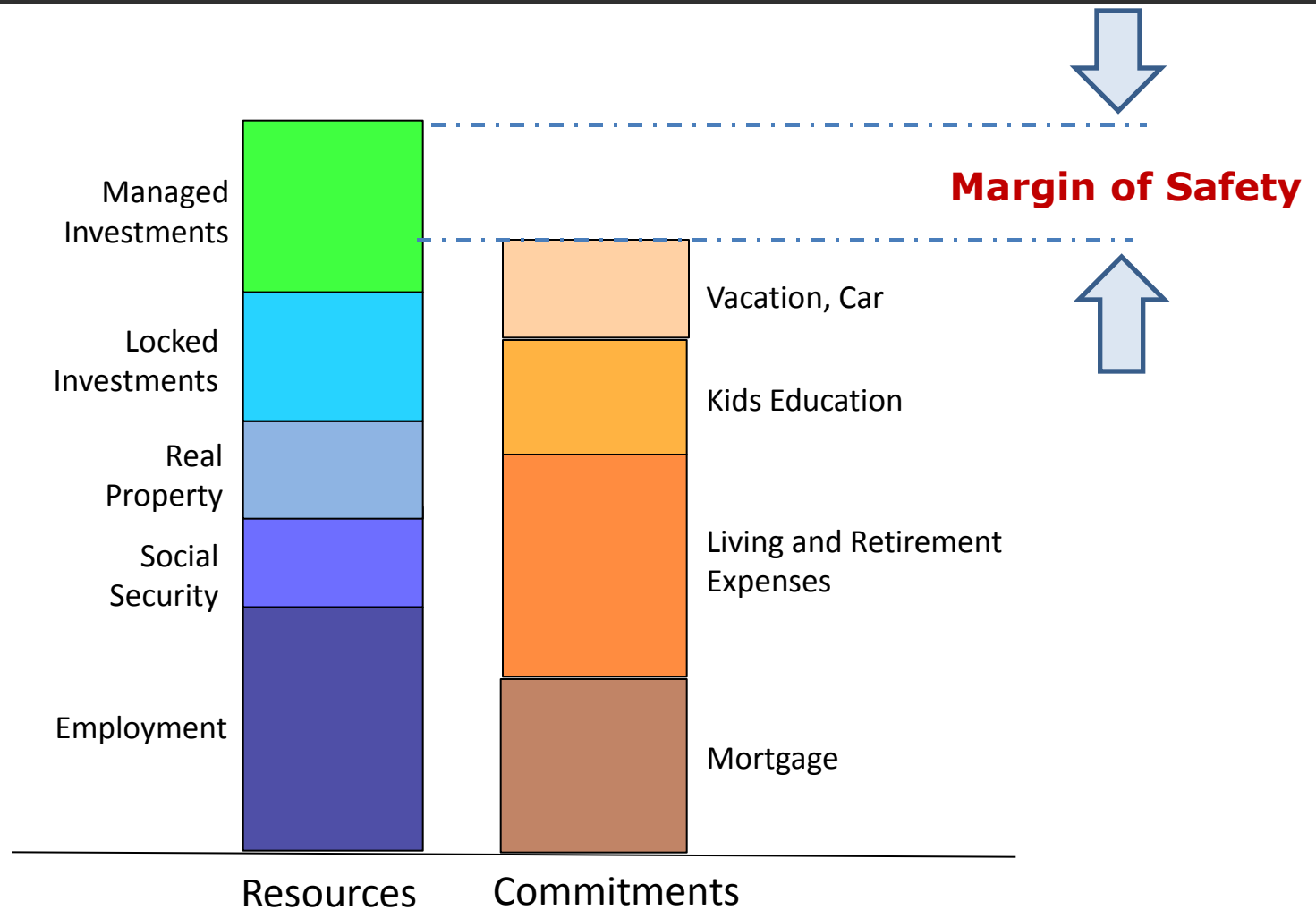
To prevent confusion, in the household context refer to them as Resources



Balance Sheet Frames The Portfolio



Balance Sheet Exhibits Risk As Impact Of Shortfall

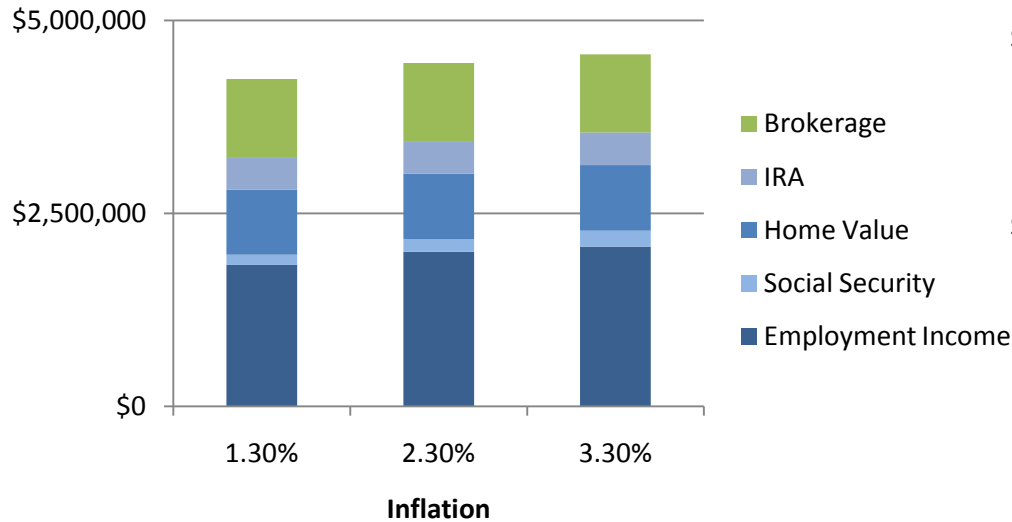


Balance Sheet Risk Exposures

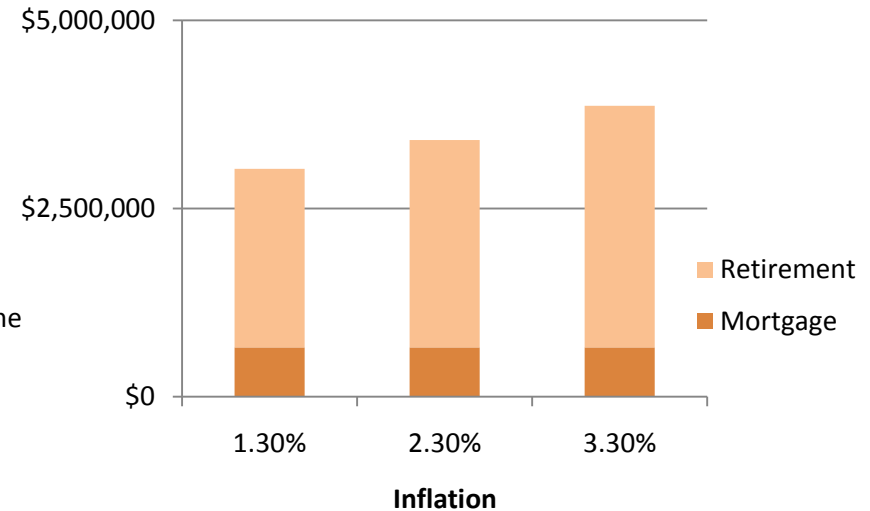


Example: Sensitivity To Inflation

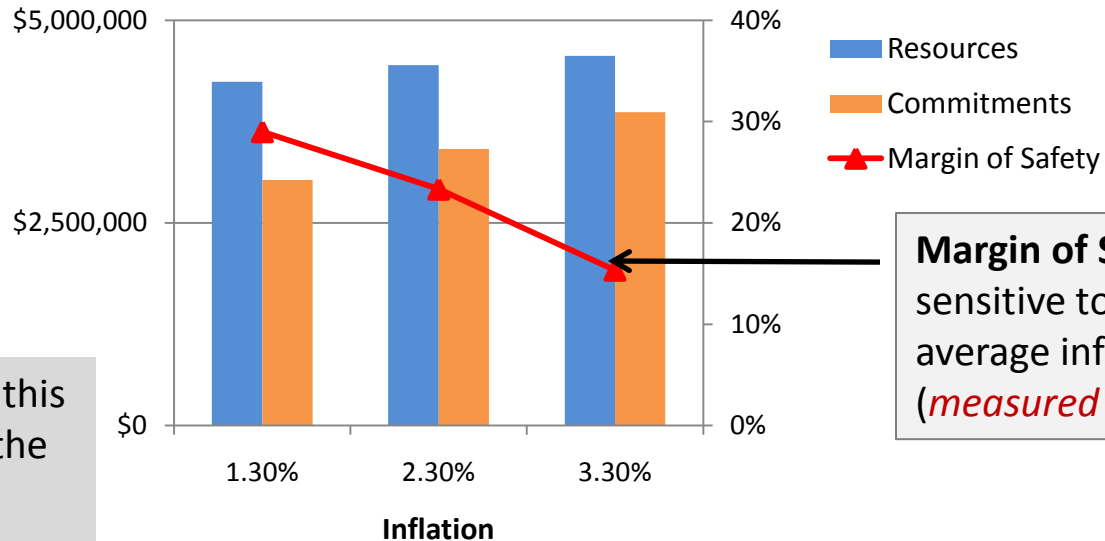
Resources are **less** sensitive



Commitments are **more** sensitive



Inflation Sensitivity is nonlinear and very high when the margin of safety is low



Margin of Safety is quite sensitive to increases in the average inflation rate (*measured in right axis*)

By implication controlling this risk is quite important to the financial stability of the household

How Do We Compute A GDI Portfolio?

We use a three step procedure to construct the GDI portfolios

Balance Sheet Analysis

- Establishes benchmark for risk measurement and risk capacity

Dynamic Optimization

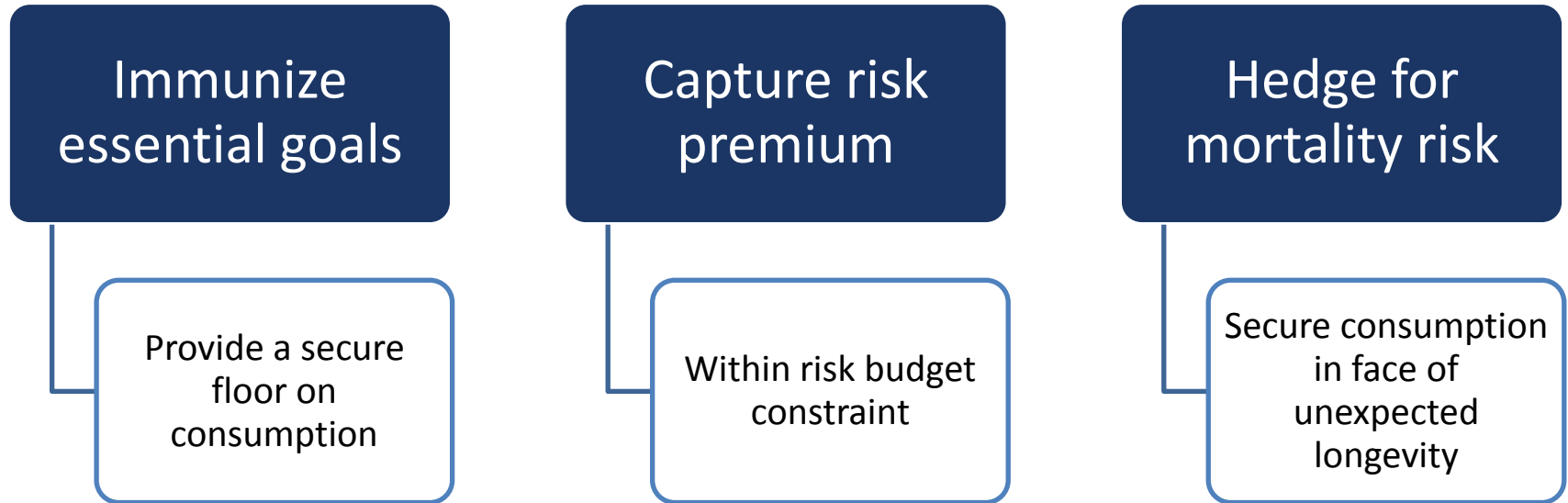
- Translates risk capacity into a tracking error budget for the next period

Mean-Variance Optimization

- Builds the efficient portfolio meeting the tracking error budget

What Does a GDI Portfolio Look Like?

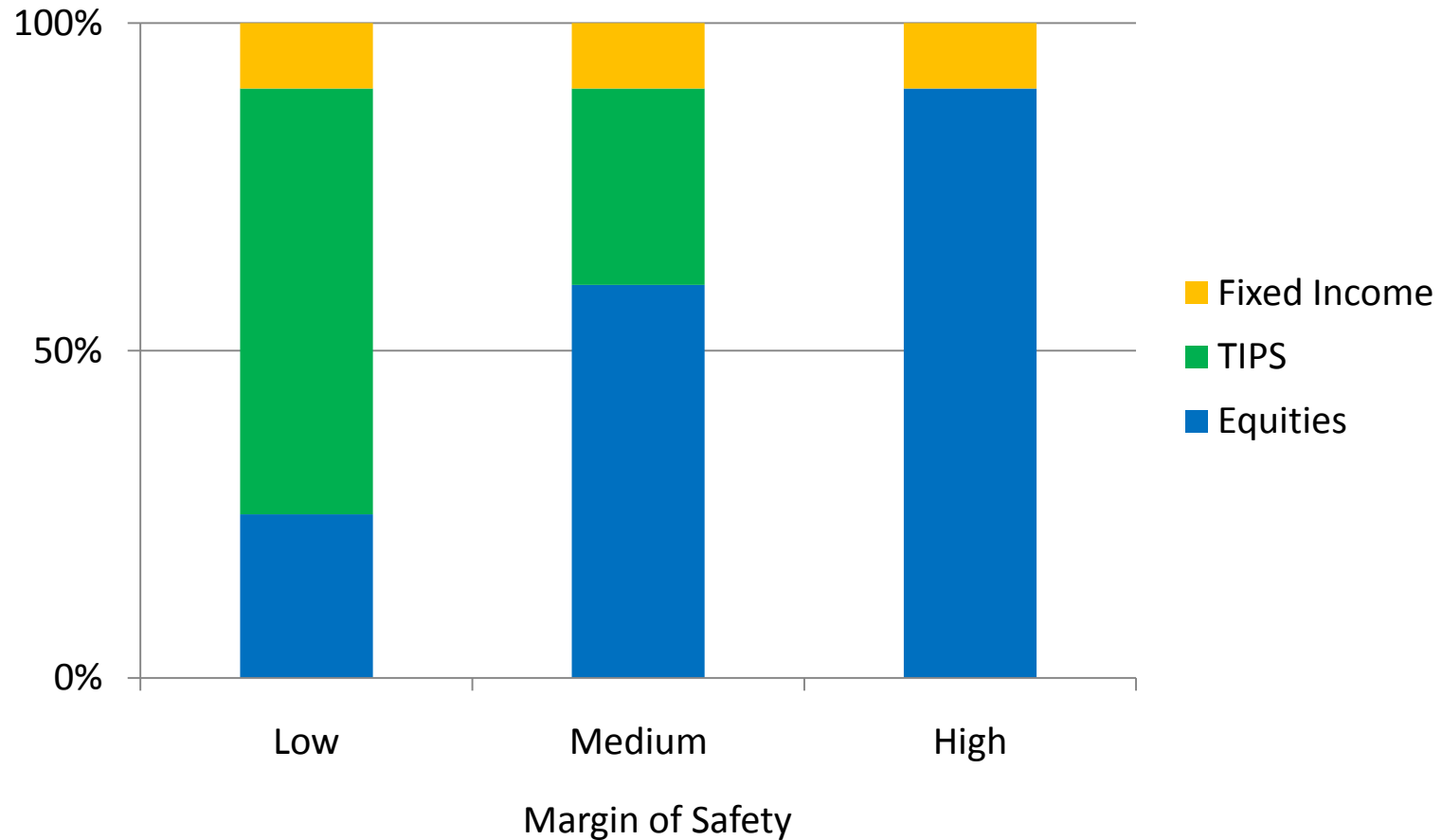
Qualitatively GDI portfolios have three components:



Changing market conditions and household circumstances cause the relative contributions of these components to evolve over time

By definition, the client is highly risk averse to any shortfall in essential goals, which influences TIPS exposure. Comparison between portfolio and goal structure motivates discussion between advisor and client

Margin of Safety Drives Asset Allocation



Note: In this and subsequent slides we use TIPS to represent the class of inflation hedging assets, which could also include certain real assets, commodities, etc.

Margin of Safety

Low

- Limited capacity to bear risk leads to selecting assets to minimize tracking error between Resources and Commitments.
- In many typical situations the result is a healthy allocation to TIPS.

Medium

- Moderate capacity to bear risk
- Results in equities partially displacing TIPS, increasing expected return at a cost of increased risk.

High

- A high capacity to bear risk
- Permits aggressive pursuit of return. Equities totally displace TIPS.

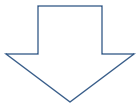
Role Of Fixed Income In Portfolio

- Is primarily to hedge financial Commitments and near term spending. The allocation is little effected by the margin of safety.

Composition of Commitments and Nonfinancial Resources Evolves With Time

Age 20s/30s

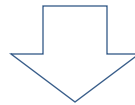
Less financial assets
More human capital



Contribution of
financial assets to
risk budget is low

Age 40s/50s

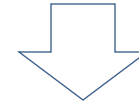
More financial assets
Less human capital



Contribution of
financial assets to
risk budget is high

Age 60s/70s

High actuarial risk

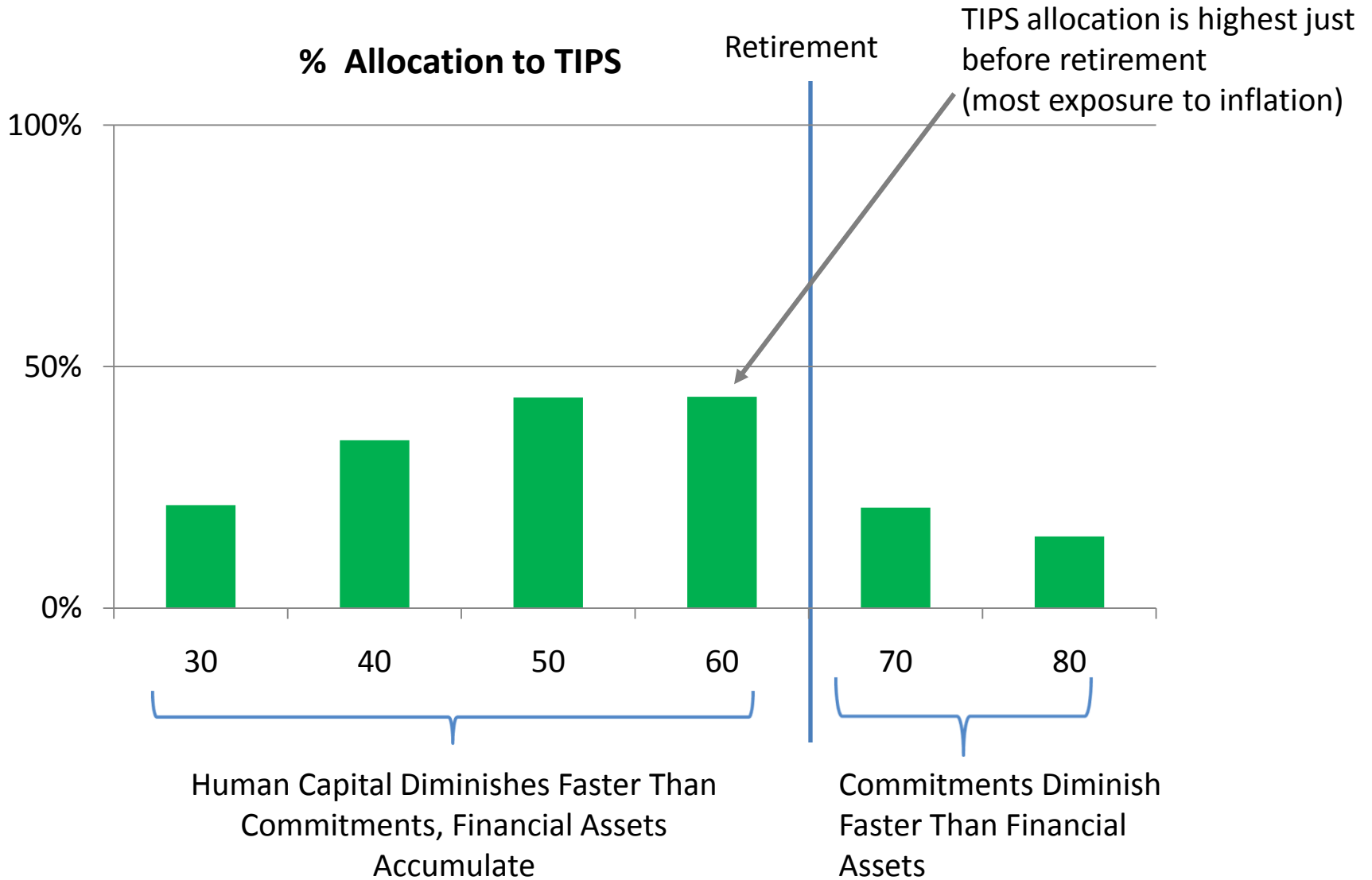


Mitigate risk by
annuities

Margin Of Safety approximately constant with time, but may increase if
Commitments burn down faster than Resources

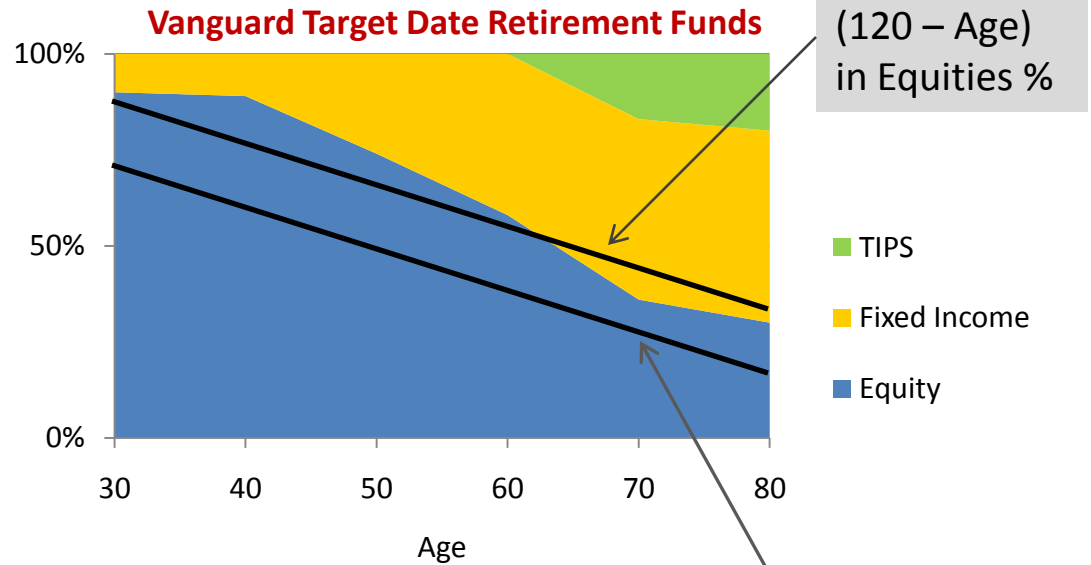
Portfolio evolves in response to these drivers

Example: Focus On TIPS Allocation

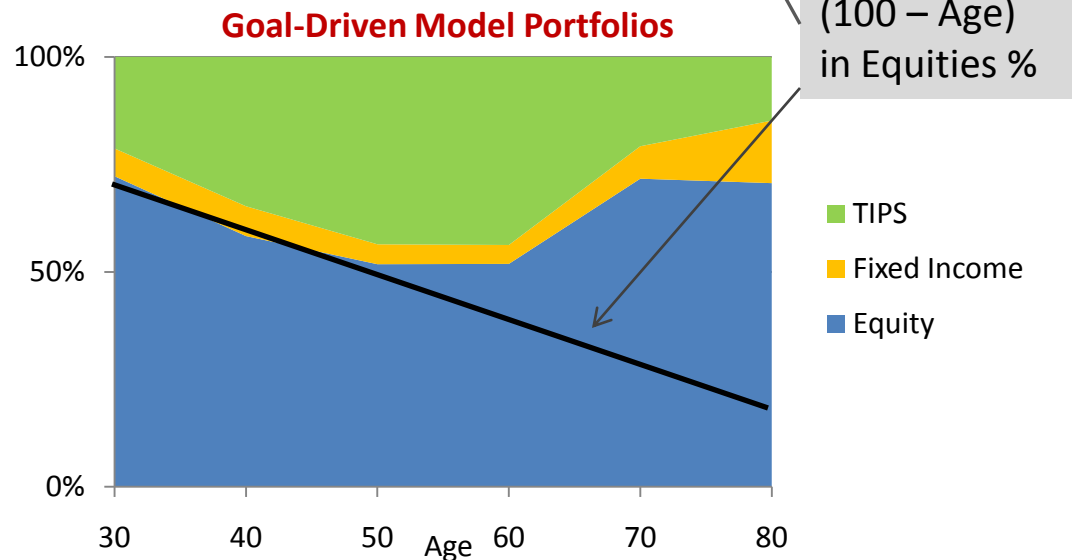


Representative Glide Paths Differ Markedly From Target Date Funds

Deterministic glide path driven by age

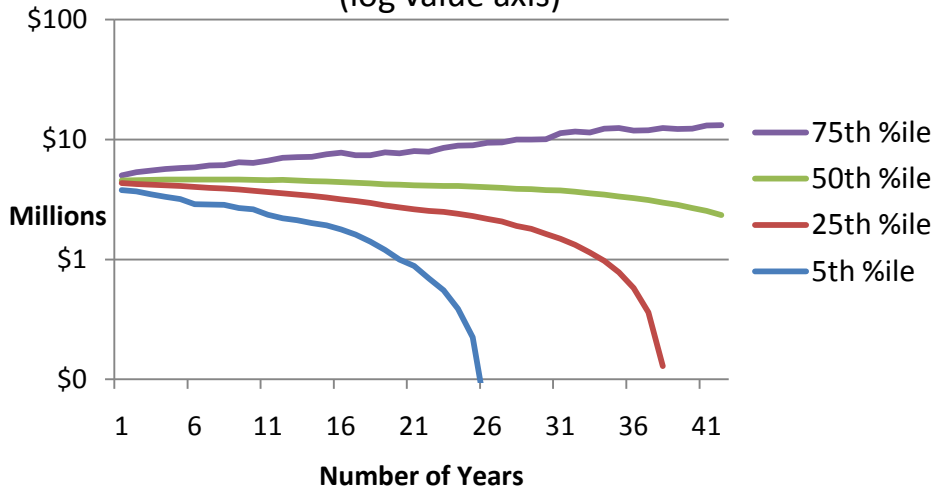


Adaptive GDI portfolio driven by Balance Sheet

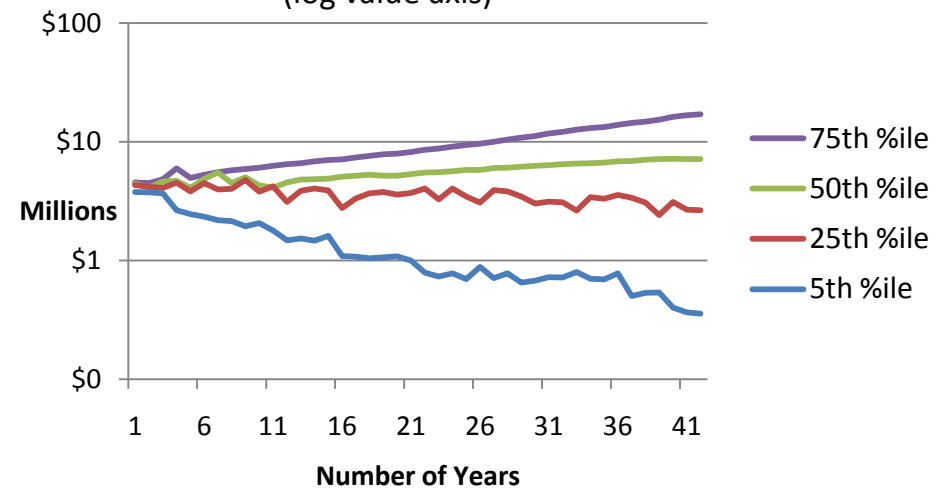


Simulation Analysis of Portfolio Strategies

Value of Fixed Mix Portfolio (log value axis)



Value of GDI Portfolio (log value axis)



Faced with a required payout, fix mix portfolios run out of money much of the time. The only cure for this problem is to dial risk taking down, so sacrificing substantial investment opportunity.

The GDI portfolio adapts to past results, so stabilizing outcomes. It rarely runs out of money and capitalizes on the substantial upside opportunity.

The non-adaptive glide path of target date funds delivers results similar to fix mix.

GDI approach is

- Intuitive
- Genuinely different
- In some cases has compelling advantages

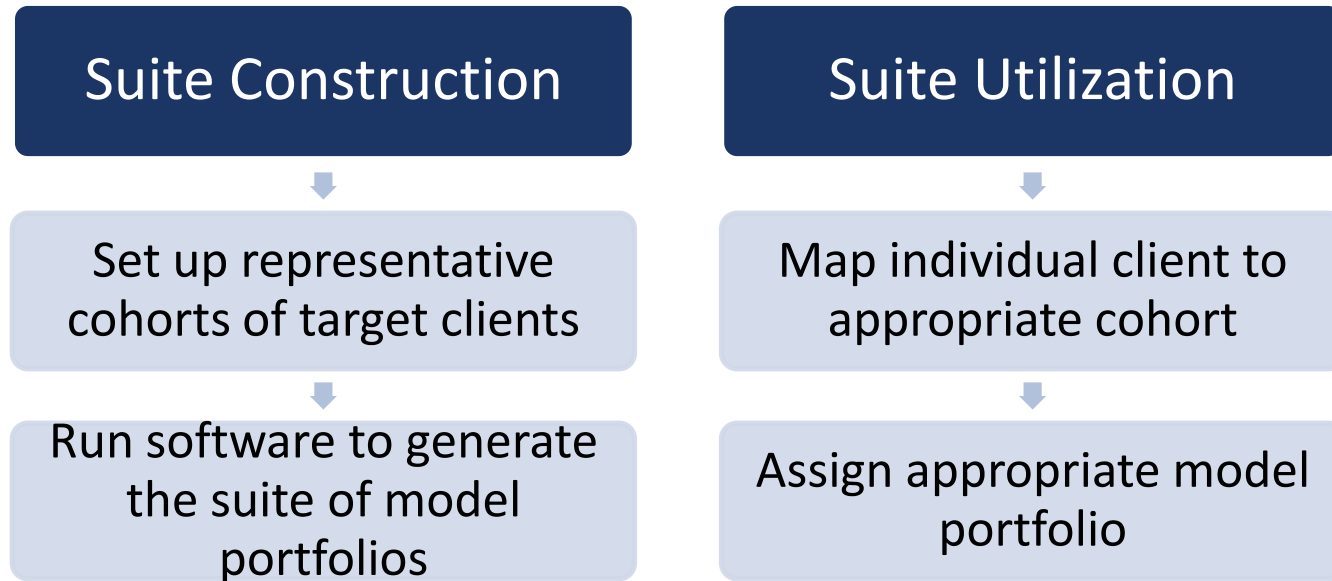
Is it implementable?

- How?
- For which clients?

Software Delivers This Investment Process Smoothly

- Permits delivery of the portfolio that is optimal for the client
- Implementation can maximize tax efficiency in rebalancing





Benefits

- Trades full customization for a productized solution
- Easier adoption in some shops by aligning skills of relationship managers
- Cost effective for clients who do not gain much from full tax efficiency in implementation (i.e. the mass affluent segment of the market)

Example: Two Cohorts At Age 50

Resources	Age 50 Cohort	
	Less Affluent	More Affluent
Assets		
Home Value	\$350,000	\$1,000,000
IRA, 401K	\$150,000	\$750,000
Brokerage		\$1,000,000
Bank Savings	\$10,000	\$10,000
Social Security per month	\$1,600	\$1,800
Employment Income per year	\$100,000	\$250,000

'Typical Household'

*Typical Household **approaching retirement** refers to the mean of the middle 10 percent of the sample*

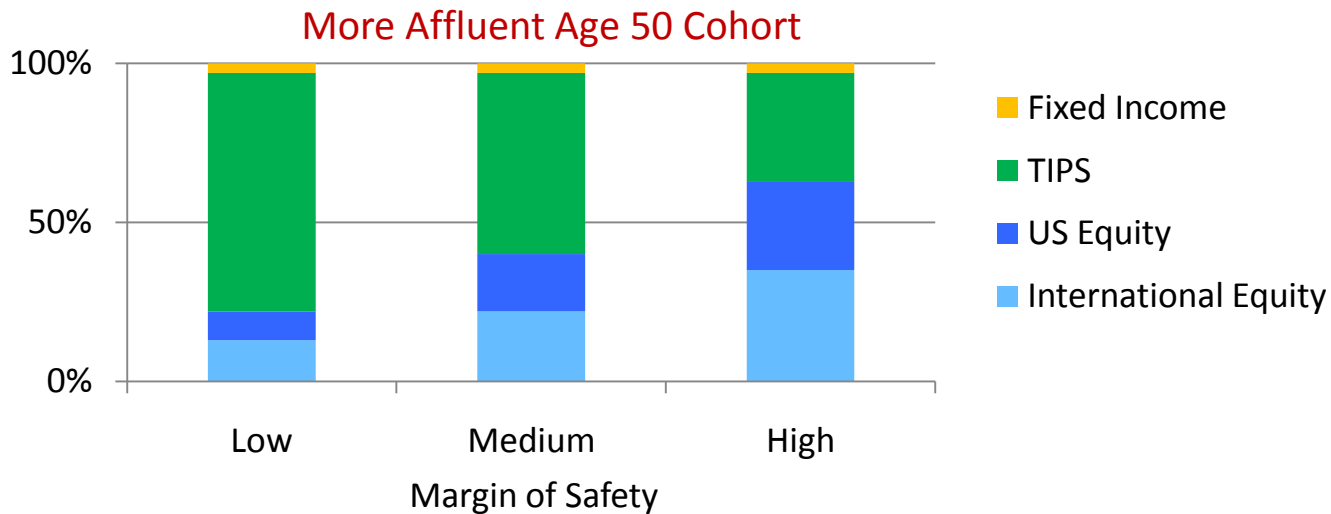
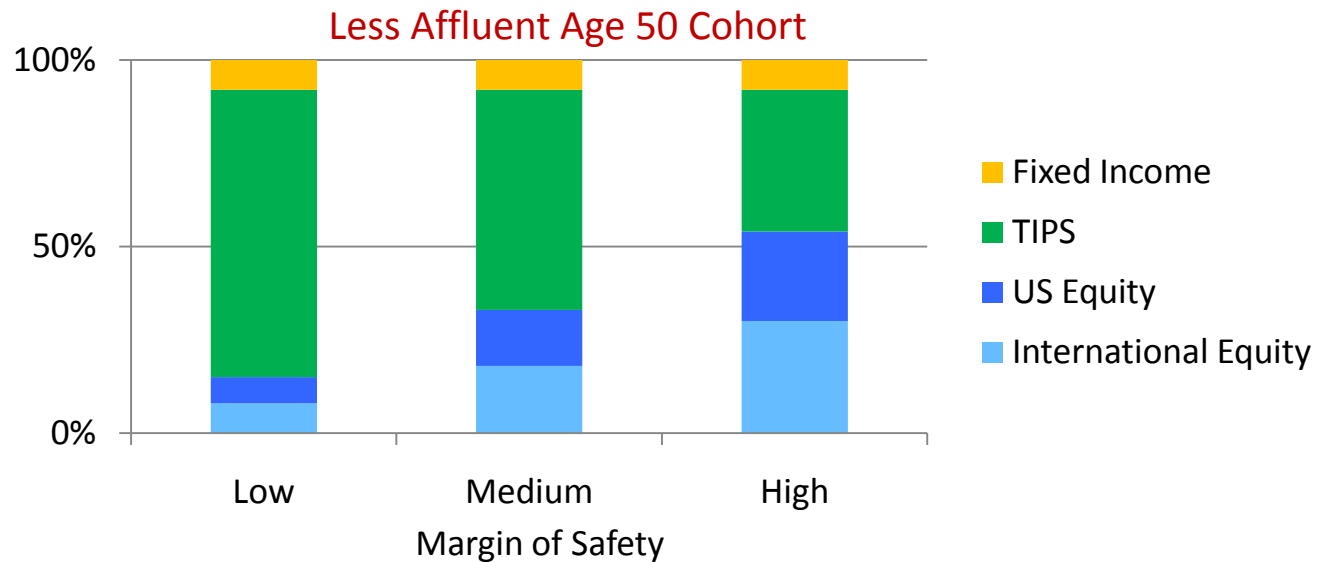
Source: [Federal Reserve Survey of Consumer Finance, 2007](#)

Commitments

Home Mortgage	\$125,000	\$600,000
Pre/Post Retirement Expense per year		
Scenario 1	\$48,000	\$142,000
Scenario 2	\$40,000	\$115,000
Scenario 3	\$33,000	\$94,000

Reference: [Boston University, Center for Retirement Research](#)

Example Models For Age 50's Cohorts



GDI is a very powerful approach for

- Helping clients think through their priorities and identify their lifetime goals, which can be summarized in the Household Balance Sheet
- Keeping clients focused on what is important, namely achieving their goals efficiently rather than attempting to beat some irrelevant performance bogey
- Making financial planning more relevant, enabling the delivery of high-quality advice consistently within existing client service channels

Goal-Driven Investing: Assuring a sustainable standard of living in retirement

Patents awarded:

U.S. Patent No. 7,516,095 B1 “Stochastic Control System and Method for Multi Period Consumption”

U.S. Patent No. 7,689,494 B2 “Simulation of Portfolios and Risk Budget Analysis”

U.S. Patent No. 7,844,523 B2 “Automatic Mapping and Allocation of Beneficial Interests in Trusts for Portfolio Analysis”