

Risk Management for Private Wealth



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Managing Private Wealth is Different

- **Good private investing involves considering:**
 - The need for risk-taking flexibility as highly specific personal circumstances are traversed.
 - Multi-period complexity, opportunities and pitfalls for value-added imposed by taxes.
 - Implicit employment and business assets and implicit future spending liabilities – the big picture.

- **Which implies that:**
 - Though institutional risk management practices can be helpful...
 - They need adjustment and a greater fiduciary involvement for the private wealth arena.



Agenda

- **Flexible, big-picture risk-management**
 - **Asset-liability framework -- implicit assets and liabilities**
 - **Adapting mean-variance portfolio optimization to maximizing long-term median outcomes**

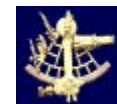
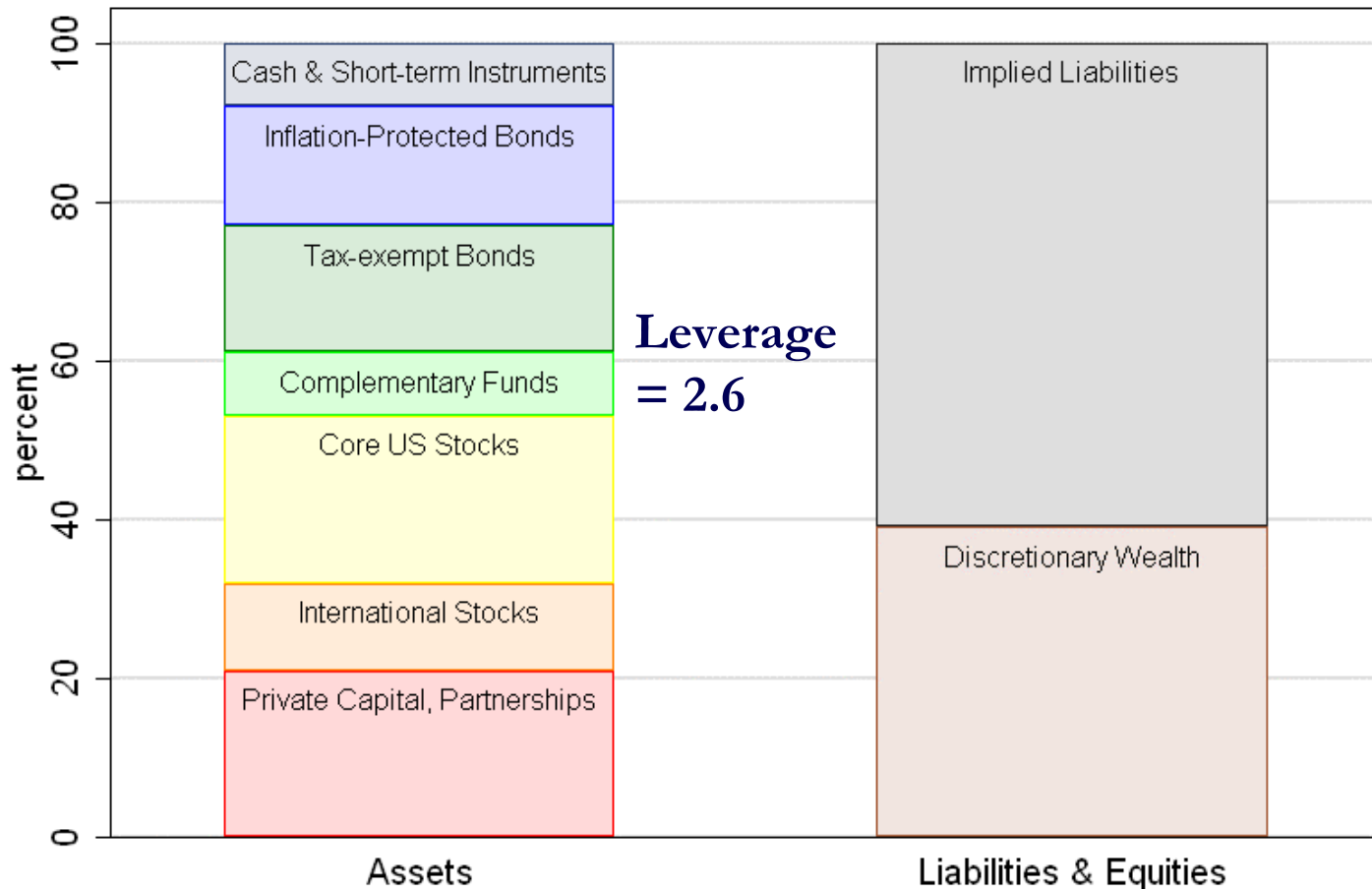
- **Taking taxes into account**
 - **Impact on asset allocation**
 - **Promoting tax-loss harvesting**

- **Complementary funds for better diversification.**

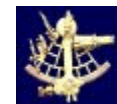
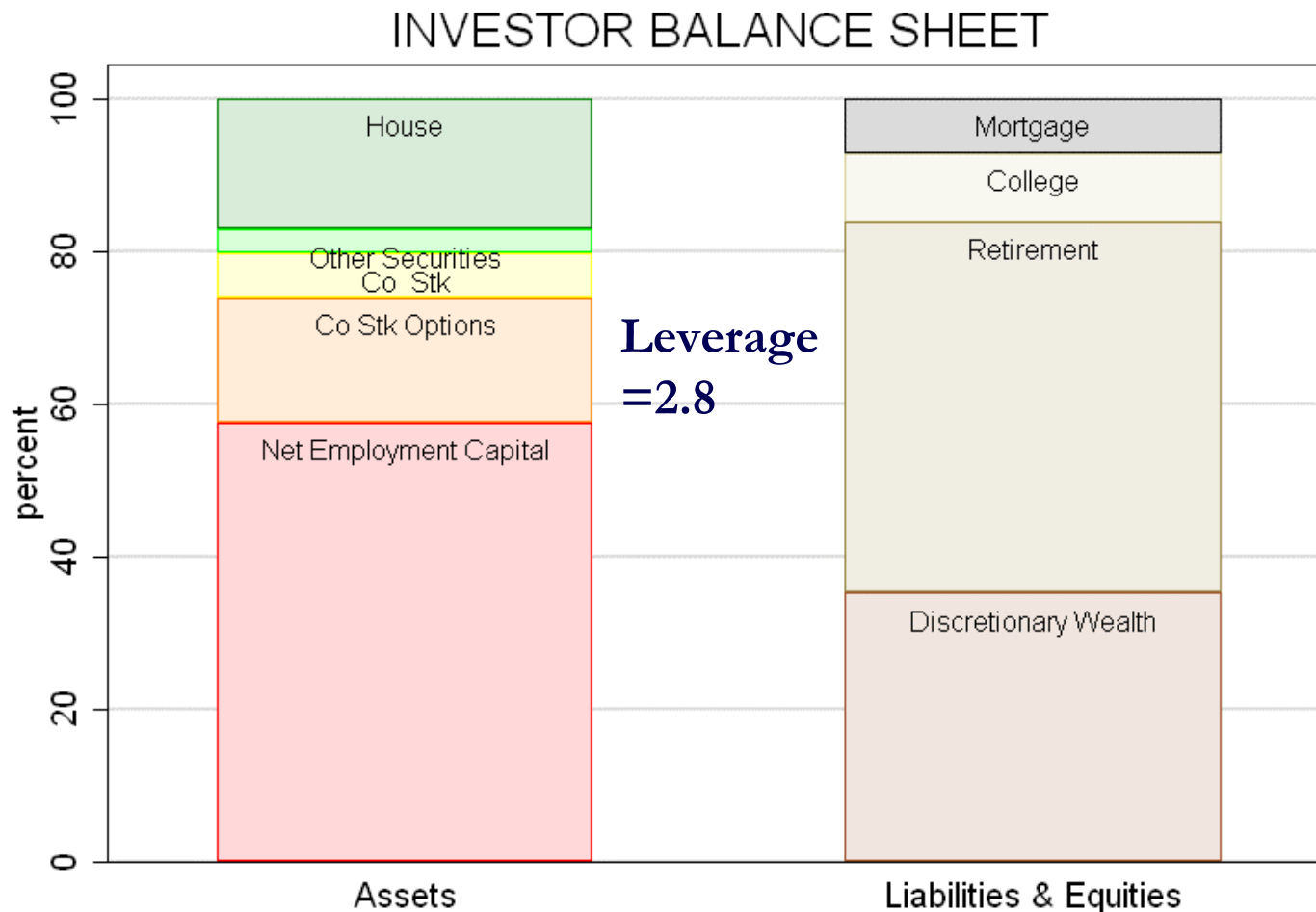


Asset-Liability Framework: Established Wealth

INVESTOR BALANCE SHEET



Asset-Liability Framework: New High Net Worth Employee



Optimizing Lifetime Median Wealth (If you don't have to worry about shortfalls)

- Improving the expected *log* return for each independent investment period improves the long-run median compound return. (Think Central Limit Theorem.)
- In continuous-time finance, maximizing $E - V/2$, where E is mean period arithmetic return and V is return variance, is equivalent.
- For discrete investment periods, $E - V/2$ may pay *too little* attention to infrequent large losses.
- On the other hand, given our finite lifetimes, expected log return may pay *too much* attention to *extremely* rare large losses.
- Approximating expected log return with the first four terms of its Taylor series is sufficient to bring in downside risk without assuming infinite lifetimes.



Discretionary Wealth Hypothesis: Avoid Shortfalls, Grow *Discretionary* Wealth

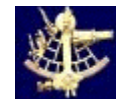
- If losing more than 50% of total wealth represents disaster to you, then:
 - Your leverage L on discretionary wealth is 2.
 - A return of 10% on total assets is a return of $10\%L$, or 20%, on discretionary wealth.
 - Standard deviation of return of 20%, and return variance of .04, becomes variance of $(L^2).04$, or .16.
- Each period, you should approximate maximum expected log return on discretionary wealth by maximizing $LE - L^2 V/2$.
- Unless you contemplate additional outside borrowing, this is Markowitz mean-variance optimization, maximizing $E - LV/2$.



When You Really Need It – And Why Each of Us Reacts Differently to Variance, Skew and Kurtosis

- Expected log return by statistical moment when mapped into return on discretionary wealth:
 - Where S is return skewness, 0 for a normal distribution
 - And K is return kurtosis, equal to 3 for a normal distribution.
- Skew and kurtosis effects will be very small and can be ignored, unless:
 - Very undiversified portfolio
 - High leverage
 - High volatility
 - Long periods between rebalancing.

$$\text{Expected } \ln(1+Lr) \cong \ln(1+LE) - \frac{L^2V}{2(1+LE)^2} + \frac{SL^3V^{\frac{3}{2}}}{3(1+LE)^3} - \frac{KL^4V^2}{4(1+LE)^4}$$

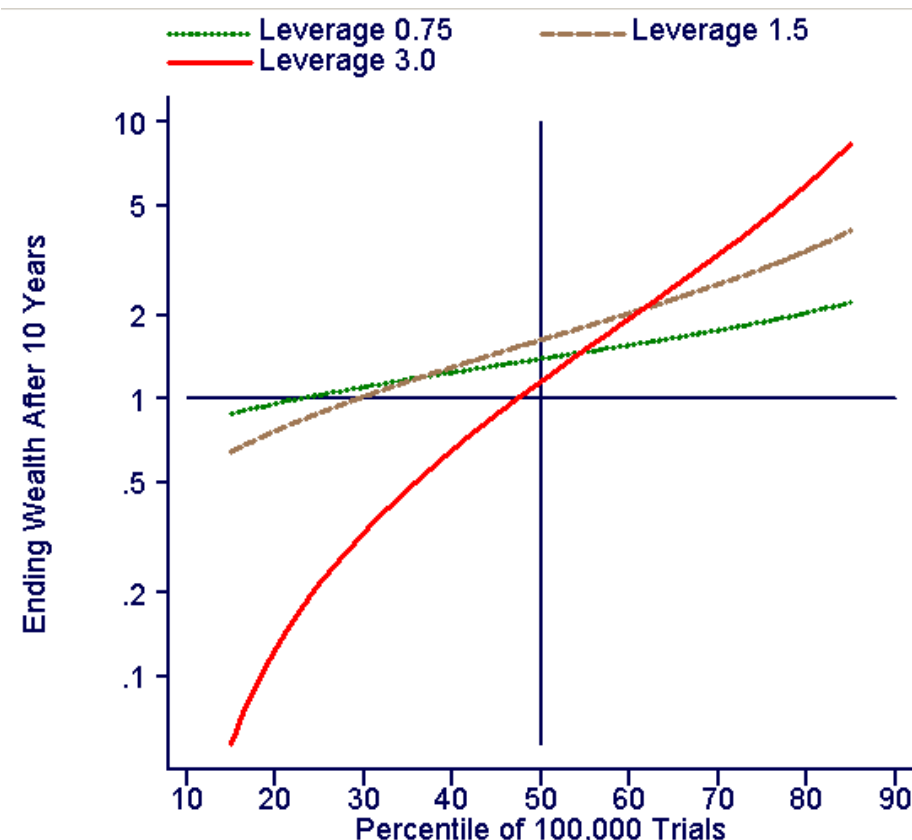


When Mean-Variance Optimization Works: Diversified Stock Portfolios for Most Investors

➤ Monte Carlo simulation of the impact of different stock leverages on discretionary wealth where:

- *Log-normal* returns
- L not very high
- Mean *excess* stock return vs cash E : .06
- Return variance V : $.20^2$
- Leverages L on discretionary wealth = 0.75, 1.5, 3.0

➤ Choose L to maximize:
 $LE - L^2V/2$



Selecting Best Leverage on Margin of Safety



Measuring Risk-Adjusted Performance:

- What is performance adding to expected log return at the portfolio level?
 - Appropriate risk-adjusted return: $\Delta E - L\Delta V/2$, measured at the portfolio level. It sometimes needs elaboration if skew and kurtosis effects are material.
 - Sharpe ratio sometimes gives wrong signals.
 - Information ratio often gives wrong signals
 - Example: it penalizes performance equal in return to that of the benchmark but lower in total risk.



Advantages of Discretionary Wealth Approach for Private Wealth

- Leads investor to quantify implied assets and liabilities.
- Adds objectivity and discipline to initial choice and later adjustment of risk tolerance:
 - Reveals median long-run consequences of today's risk choices
 - Sale of business or retirement changes implied balance sheet
 - Unusual losses or gains change reaction to potential future interim shortfalls.
- Tie-in to mean-variance optimization:
 - Makes diversification a primary consideration
 - Enables more comprehensive understanding of tax impacts.



Taking Taxes Into Account: Applicable Tax Rates

- Holding longer periods means the effective long-term capital gains tax can be anywhere from the official tax rate τ to zero.
- $(1+r(1-\tau))^n$ can be much less than $(1+r)^n(1-\tau)+\tau$.
- Setting the latter equal to $(1+r(1-\tau^*))^n$ gives the effective tax rate τ^* ,
- Unless
 - The effective rate is lower because of matching with a loss-carryforward.
 - The gains are untaxed, for example, because of a charitable donation.
- Estimating the likely effective tax rate is important in determining proper asset allocation, because...



We Can Take Advantage of Government Risk Sharing

- Expected single-period return:
 - $E(1-\tau^*)$
- Expected return variance:
 - $V(1-\tau^*)^2$
- Taxes reduce the risk in mean-variance optimization more than they reduce mean return.
- Allowing taxable investors to allocate more to riskier asset classes such as private capital, other things equal.



Selective Turnover and Tax Loss Harvesting

- Taxable investors with imposed turnover can further benefit from taking on risks:
 - Like any option, the option as to when to realize losses and gains, and therefore control tax payments, is more valuable the higher the volatility involved.
 - Tax loss harvesting can substantially lower the effective tax rate rate of a moderate-turnover investment strategy.
 - This strategy is especially powerful if the incremental specific risks taken can be diversified.



Complementary Funds: Big-picture Security Selection

- Asset-liability modeling puts more focus on effective diversification of unusually large balance sheet items.
- This emphasis can usefully be extended to individual securities.
 - Should an investor 80% in long-term bonds hold the S&P 500 as a primary US stock portfolio?
 - Should someone whose company stock, stock options, and capitalized excess employment savings are 80% of assets and 2.3 times discretionary wealth
 - Hold the S&P 500?
 - Hold the completion fund for the S&P 500?
 - Something else?

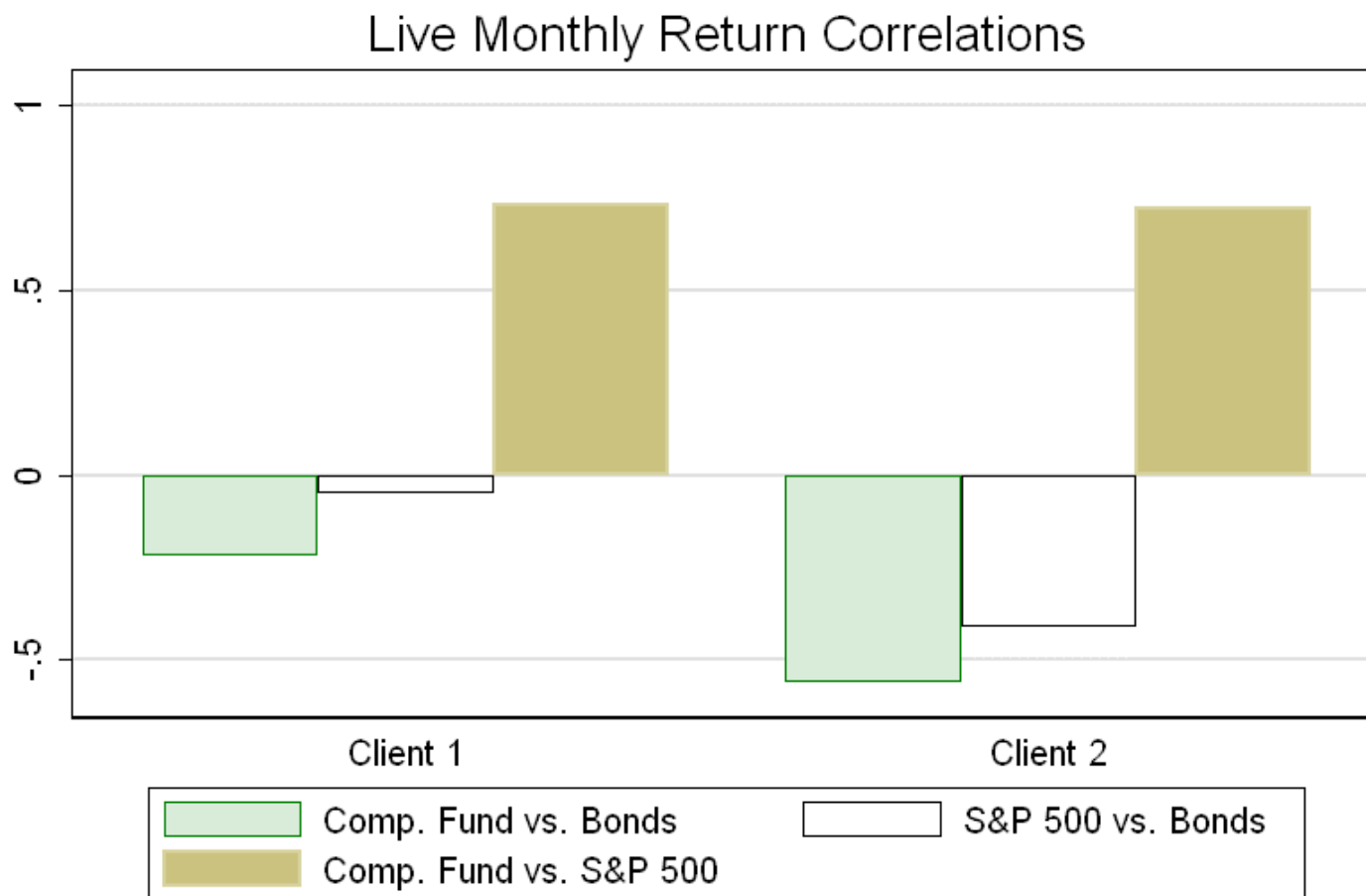


Derived Complementary Stocks for Conservative Bond Holders

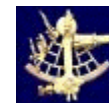
- Two clients, one an insurance company
- Live funds
- Small capitalization stocks
- Some favored categories:
 - Niche manufacturers
 - Technology, especially for the insurance company
 - Mining
 - Energy



Useful Diversification?



Client 1 -- 16 months, Client 2 -- 9 months, period ending Jan 2005



Long-term value still unproven, but...

- Ex ante – adequate diversification to enter efficient frontier.
- Live performance confirms diversifying ability...
- Higher complementary fund risk from small cap stocks leaves S&P 500 also in solution.
- Open questions:
 - How much benefit from small stocks vs. industry choice?
 - What is long-term impact of process on expected return?



Stocks for High Net Worth Microsoft Employee

- **Wide range of market capitalization**
- **Favored industries**
 - **Medical services – but not drugs or biotech**
 - **Smaller financial services**
 - **Electric, gas and water utilities**
 - **Precious metals**



A Quantitative Approach to Risk Management of Private Wealth

- Offers opportunities for value-added not always experienced by these investors
- But only if portfolio optimization is adapted to their needs:
 - Big picture – including implied assets and liabilities
 - Realistically aimed at long-term goal achievement
 - Gives implications of taxation proper attention
 - Takes advantage of overall fiduciary position to provide special services: complementary fund example.

