THE UNCERTAINTY OF DEATH AND TAXES

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In this world nothing can be said to be certain, except death and taxes.

Benjamin Franklin

But they have been hard for the investment advisor to properly quantify!

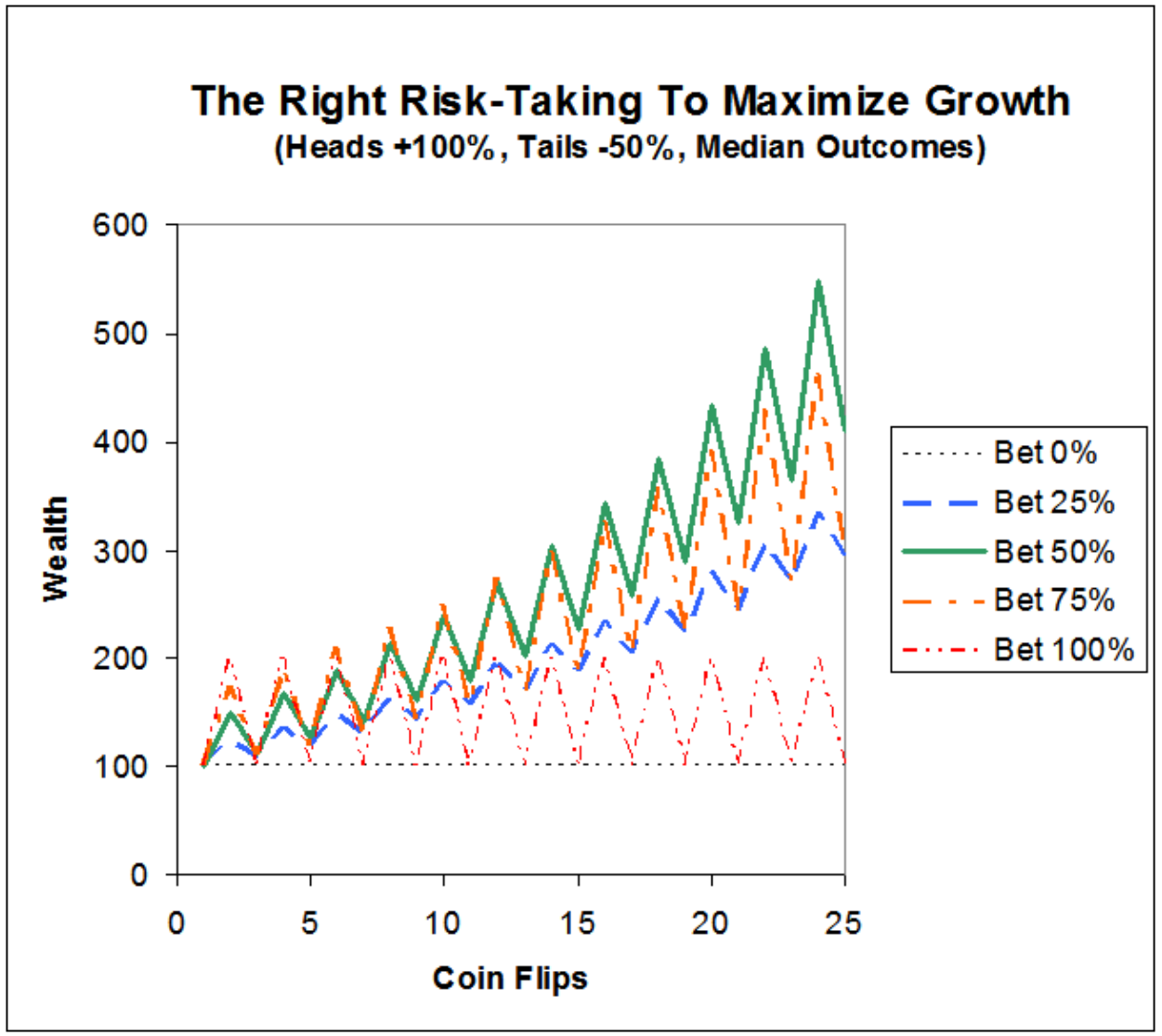
A Challenging Topic

- **We seek a single-period representation that lends itself to practical optimization.**
- **Long-term future uncertainties are not an obvious fit to this paradigm.**

An Example Approach

- **Rebecca, age 55**
  - $20 million realized after taxes from the sale of her deceased husband's business interests.
- **Five Steps to More Effective and Efficient Value-Added:**
  1. Maximizing long-run median wealth
  2. Managing discretionary wealth
  3. After-tax asset allocation
  4. Taking into better account
     - Death
     - Taxes
  5. Plan revision.

1. Maximizing Long-Run Median Wealth



Maximize Expected Log Return

- **Each period, maximize:**

  expected $\ln(1+r_t)$.

- **If return probability distributions for r_t are approximately independent, …**

- **This will maximize long-term median wealth after "many" periods.**
  - And maximize probability of being wealthier than from any other strategy.

Why Best Long-Run Median Wealth Is A Better Objective

- **Allows myopic optimization each period.**
- **Accounts for any material downside risk not captured by return standard deviation.**
- **Replaces unreliable risk attitudes with more objective assessments of financial commitments.**
- **We grow what remains, discretionary wealth, at its best expected compound rate…**
  - while avoiding intermediate shortfalls against financial commitments.

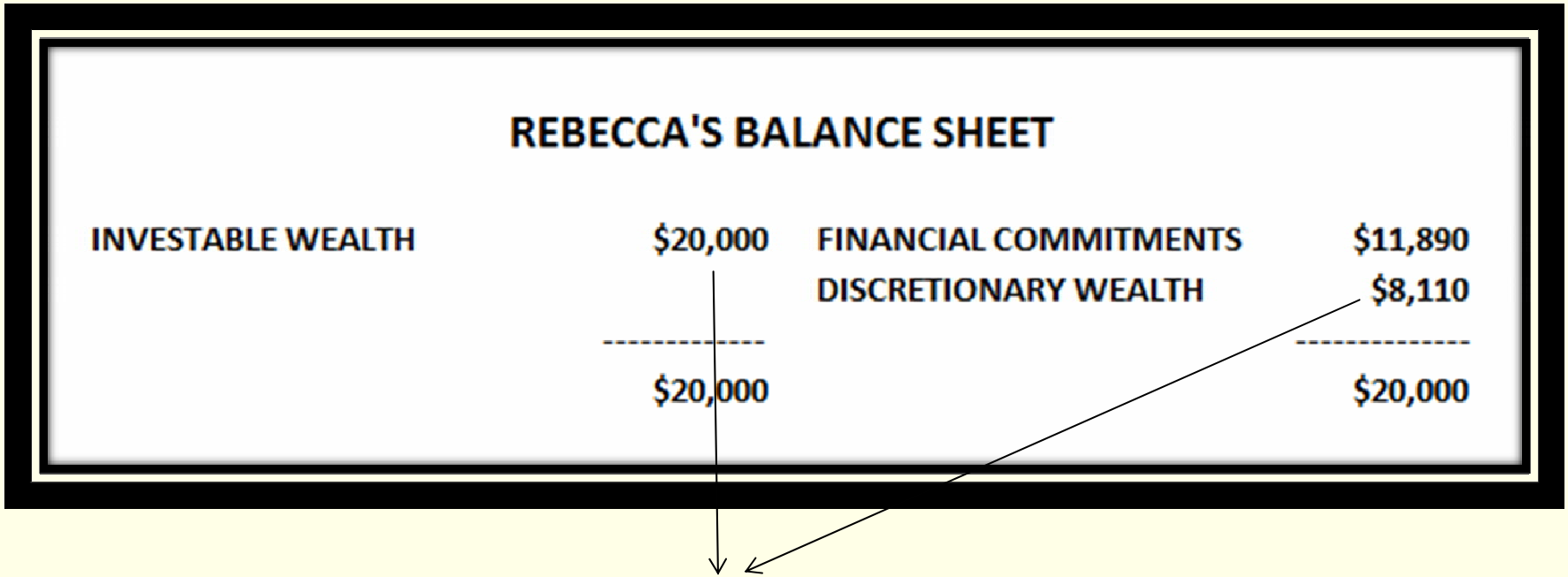
Rebecca's Profile

- Grown, financially independent children.
- She plans to continue to live in Massachusetts, using current residences.
- No work income, no additional assets.
- Planned annual expenses of $600,000.
- Life expectancy of 27.7 years.
- No interest in estate tax reduction.

2. Managing Discretionary Wealth

Applicable after-tax, after-inflation time discount rate: 2.5%.

Present value of future expense in real dollars: $11,890,000.



IMPLIED LEVERAGE: 2.466 times

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Expected Log Return on Discretionary Wealth

- **Maximize [expected ln(1+Lr)]**
  - r is the possible portfolio return
  - L is the implied leverage
- **Approximation for conventional portfolios: $LE - L^2V/2$**
  - E is expected r
  - V is the variance of r
- **We get there by trying to maximize**
  - E – (L/2)V

3. After-Tax Asset Allocation

- **Multiply pretax E by (1-T), pretax V by $(1-T)^2$, where T is the effective tax rate.***
- **Rebecca's example based on our point estimates, with V Bayesian-adjusted upward:**
  - T = 20%, L=2.466
  - pretax stock E= 0.10, V=0.04
  - tax-exempt bond E= 0.03, V=0.001
  - No correlation in returns.
- **Markowitz mean-variance optimization suggests an 80% stock allocation.**

* Effective T estimation is strategy dependent.

Discretionary Wealth Approach

- **Better specifies risk aversion**
  - Most appropriate for long-term compounding
  - More reliable measurement
  - Can help stabilize emotional reactions.
- **Usually needs only familiar Markowitz mean-variance optimization tools.**
- **But can check expected log return to see when other tools are needed.**
- **Easily updated when investor's financial picture changes.**

4A. Taking Death into Better Account

- **We can try to deal with such long-term uncertainties …**
- **By considering the probability distribution of next-period changes in our knowledge.**
  - Mean-variance optimization is a point estimate-based version of this.
- **And, by considering the probability distribution of our current knowledge.**

Consider Next-Period Changes

- **Life tables give Rebecca a 99.5% chance of living another year; afterwards her further life expectancy declines by 0.8 years.**
- **The growth rate in her financial commitment is**
  - E = -.0203
  - V = .0048, implying a std dev of 6.9%
- **Assume zero correlation to investment returns.**

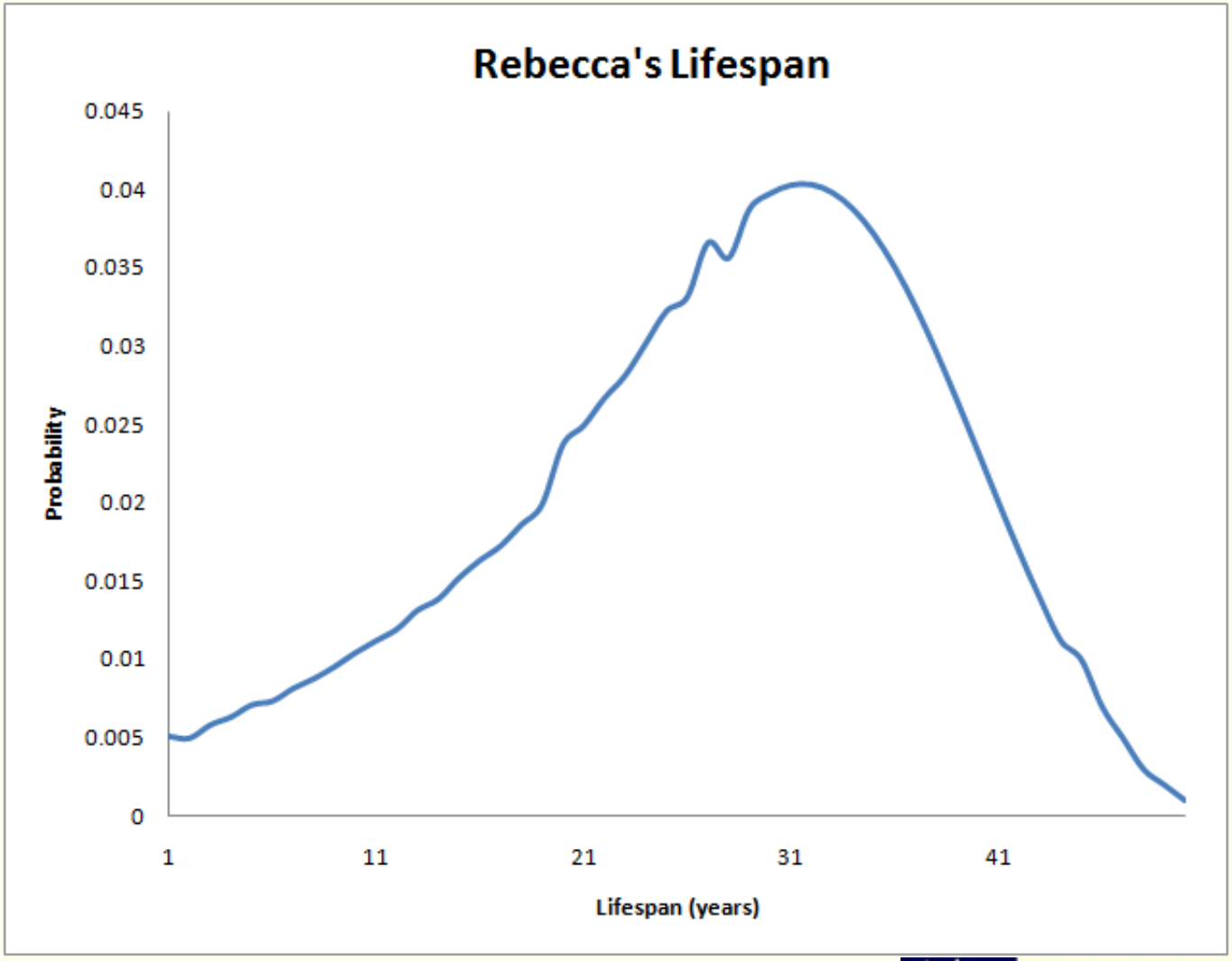
Result of Combined Mean-Variance Optimization

- Rebecca's discretionary wealth volatility is higher.
- Her expected single period wealth increase is greater.
- But because these contributions do not depend on the equity allocation,
- There is no change in optimal asset allocation.

Consider Current Status

- **We seek best portfolio E – LV/2.**
- **Our 80% stock allocation not only depended on point estimates for stock and bond V and their return correlations,**
- **But were contingent on a point estimate for L, in turn based on a point estimate for further lifespan.**
- **This procedure can be improved.**

Lifespan Probability Distribution
(From 2002 US Govt Life Table)



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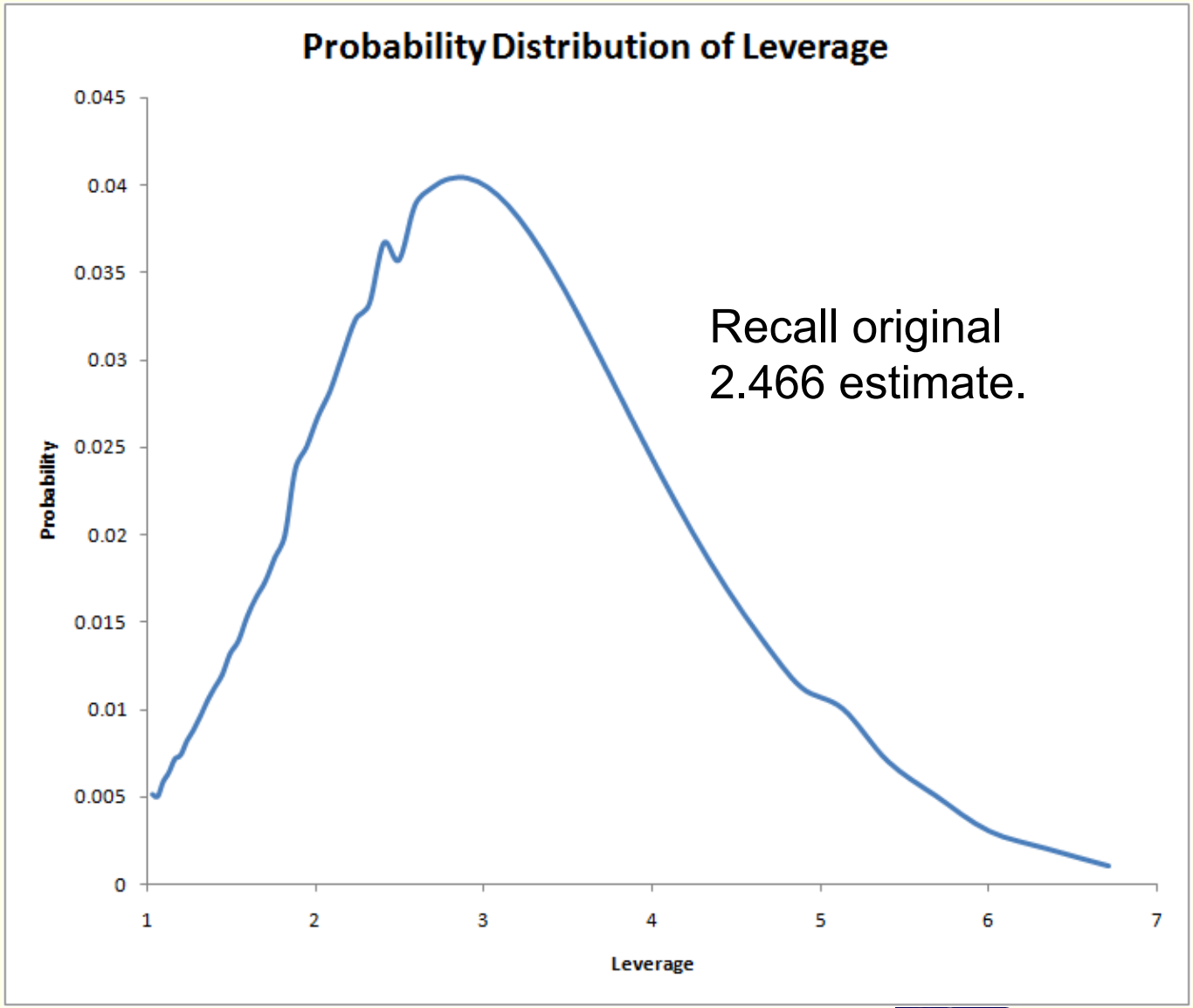
Resulting Leverage Skew



Recall original 2.466 estimate.

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Adjusting Stock Allocation for Lifetime Risk

- **Our original best estimate for optimal stock allocation was 80%.**
- **An improved estimate of the best stock allocation is given by the optimal allocation given mean leverage: 74%.**
- **Monte Carlo simulations with mean L=2.7 and standard dev L=1, normal, indicate best stock allocation as 72%. Adding skew would reduce it further.**

4B. Taking Taxes into Better Account

- **In Rebecca's example, there are no embedded tax liabilities for unrealized capital gains.**
- **Then consider only variance of next-period returns:**
  - We began with stock V multiplied by a fixed $(1\text{-}T)^2$
  - If T is also risky, we must begin not with V but with $V_{r(1\text{-}T)}$.

Adjusting For Risk in Tax Rates

- **Assume we have estimated $V_{r(1-T)}$ as .03, up from .0256.**
- **The best stock allocation at mean L would be reduced from 74% to 63%.**
- **Surmise that optimization over Monte Carlo simulations would further reduce this to no more than 60%.**

What About the Case with Unrealized Capital Gains?

- **A future liability at the current tax rate**
  - discounted back to the present time
  - nominal, not real, time discount rate.
- **Treat risk the same way as we did for the present value of future spending**
  - Probability distribution for leverage L.
- **Approximate optimization over Monte Carlo simulations with best allocation given mean L.**

5. Plan Revision

- **The application of the discretionary wealth approach period-by-period:**
  - Is an easy motivator for productive investor reflection on the revised balance sheet.
- **If not offset by revised E, changes in L act like a better form of dynamic hedging against shortfalls.**
  - Decreased single-period return from the implied option premium is optimized for long-term compound return.

After Significant Events or Time Has Passed

- You know it because L will have changed.
- The investor gets older and the present value of future spending changes.
- Balance sheet ratios also reflect material changes resulting from both portfolio returns and spending patterns.

Rebecca at 60

- **Three significant changes**
  - A very strong globally-diversified stock portfolio
    - Including emerging markets
  - Fewer years of spending to finance
- **Have created a mean L reduced from nearly 2.7 to 2.2.**
- **Rebecca should increase her stock allocation to about 75%.**
  - She may face new horizons.

Conclusions

- **The discretionary wealth framework offers a foundation for quantifying long-term uncertainties involved with death and taxes.**
- **Uncertain lifespan results in a increased expected discretionary wealth leverage and a reduced optimal allocation to risky assets.**
- **The same is true for uncertain tax rates applied to unrealized capital gains.**
- **Uncertain tax rates, however, also decrease stock allocations directly through increasing the *ex ante* variance of after-tax returns.**

Like a man traveling in foggy weather, those at some distance before him on the road he sees wrapped up in the fog, as well as those behind him, and also the people in the fields on each side, but near him all appears clear, though in truth he is as much in the fog as any of them.

Benjamin Franklin

SUGGESTED READING

- **Investment Management for Taxable Private Investors**
  - Jarrod Wilcox, Jeffrey Horvitz and Dan DiBartolomeo, Research Foundation of CFA Institute, 2006.
- **"Harry Markowitz and the Discretionary Wealth Hypothesis"**
  - Jarrod Wilcox, Journal of Portfolio Management, Spring 2003.
- **Bayesian Data Analysis, 2nd Edition**
  - Andrew Gelman, John B. Carlin, Hal S. Stern and Donald B. Rubin, Chapman & Hall/CRC, 2004.