PRESENTATION TO SAN JOSE POLICE & FIRE BOARD

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The Efficient Frontier

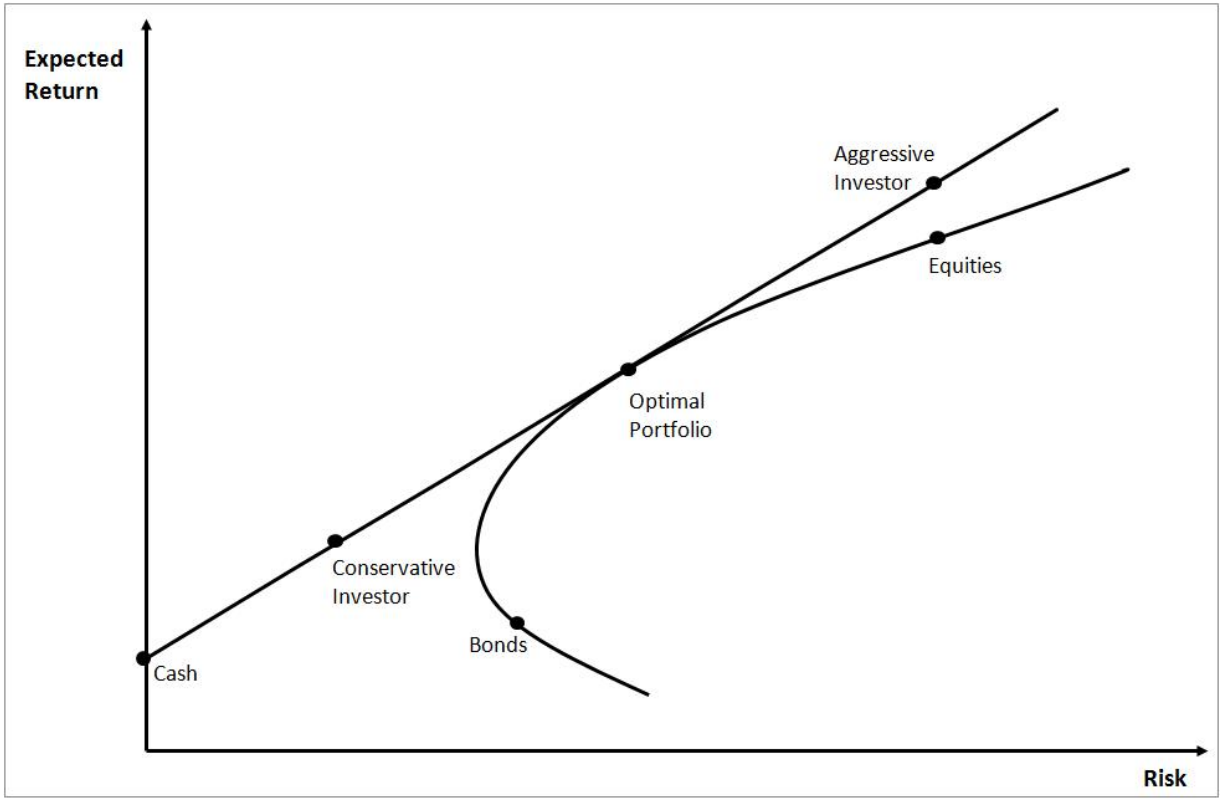

Figure: The Efficient Frontier

Investor Preferences

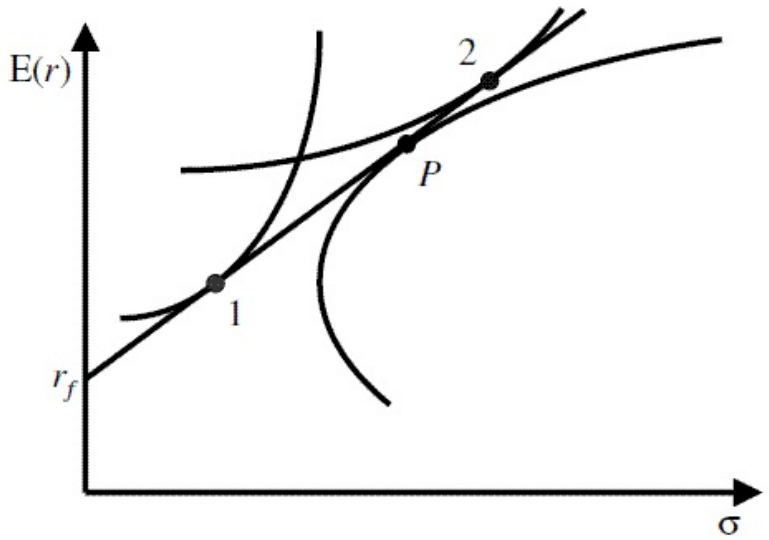

Figure: Investor Preferences on the Efficient Frontier

Dos and Don'ts

DON'Ts

- Do not tinker with the CMAs
- Do not tinker with the portfolio weights
- Do not second guess your investment staff

DOs

- Review critically the CMAs
- Set constraints
- Decide where on the efficient frontier you want to be

Does it Really Apply?

Two ways to get there:

- Returns are Normally distributed (bell-shaped). In that case, Mean/Variance describe the entire distribution. There is nothing else.
- You have a Mean/Variance utility function. Maybe there are other features of the return distribution, but you don't care about them.
- Unfortunately ... both of these are obviously NOT TRUE in the real world.
- Therefore, the Efficient Frontier doesn't tell the whole story.
- Example: We believe that there are occasional large, negative shocks (left skew).

CONCLUSION: We have to consider other attributes of the portfolio.

Distributions are hard

- Mean/Variance don't tell you the whole story. Tails are important (especially the left tail).
- Tails are VERY hard to model.
- If anyone tells you something like "There is a 5% probability that your return will be worse than -X%" ...
- DON'T BELIEVE A WORD OF IT. NO ONE HAS ANY IDEA WHETHER ITS 5%, 10% OR 1%!!
- Don't be lulled by a false belief that we have it all modeled out.
- Remember Niels Bohr's dictum: "Prediction is very difficult, especially about the future!"

Some Progressive Steps

A suggestion for building up to your final portfolio. Start simple, then add complexity.

- 60/40
- Simple Passive Portfolio
- More Complex, "quasi-Passive" Portfolio
- Active Portfolio

At each stage, you should ask, "Do we believe this added complexity will yield better results? If not, why are we doing it?"
Ex-ante, you should always be adding more risk-adjusted ER. But maybe ex-post you don't.
This approach allows you to break out each layer of complexity and analyze it for added value.

Liability Driven Investing

Like Mark Twain said about the weather, "Everybody talks about it, but nobody does anything about it."
Two ways of approaching it:

- Take a slice of the liability stream that has a PV of $1 (using the Treasury Yield Curve to discount).
- This is your new "currency". Denominate all assets in this currency, and compute ER and Risk accordingly.
- In this world, your risk-less asset is a dedicated bond portfolio that matches the liabilities. The risk-free rate is 0.
- Or, stick with USD, but consider that you portfolio is long assets, short liabilities.

Ultimately, these will get you to the same place.

- "OH NO! Interest rates just spiked and our assets just plummeted in value.
- "Oh ... Wait! The liabilities just plunged in value as well. Sort of cancels out :-)

The Fallacy of the Law of Large Numbers

- Our portfolio has an ER of 6% (Let's assume this is true)
- The average return over just a few years may be very different from 6% (True)
- The average return over (large) T years will get quite close to 6% (True)
- Therefore, our portfolio returns over T years will be close to $1.06^T - 1$ (False!)

A Coin Tossing Example

- Coin has a $p(H) = \frac{1}{2}$
- Percentage of H over 4 tosses could be quite different from 50% (True)
- The percentage of H over (large) T years will get quite close to 50% (True)
- Suppose toss 1,000,000 times and get 49.9% H. That's very close to 50%
- But we are 1,000 H SHORT!!!
- The shortfall in the average is compounded over 1,000,000 tosses!