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Passive Management, Market Efficiency and Long Term Return Premia

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Key Points for this Talk

- We will review the concepts of "market efficiency" and "economic efficiency" and their conventional definitions
- Digression: A quiz for the audience
- Assert that if market are *economically efficient*, the heterogeneous nature and preferences of investors must be captured in asset pricing
- Illustrate a mechanism to discover and classify investor attributes and preferences
- Describe a patented mathematical representation of the problem
- Conclude with a review of some empirical evidence in support of our assertion

Economic Efficiency (Wikipedia)

- Economic efficiency is the use of resources to produce goods and services. An economic system can be said to be more efficient than another (on a relative basis) if it can produce more goods and services without using more resources. In absolute terms, a situation may be called economically efficient if:
  - *No one can be made better off without making someone else worse off (commonly referred to as Pareto efficiency)*
  - No additional output can be obtained without increasing the amount of inputs
  - Production proceeds at the lowest possible per unit costs

Market Efficiency

A market in which prices at any time "fully reflect" available information is called "efficient" (Fama, 1970, JOF, p 383). *Note the quotation marks around "fully reflect". He repeated the use of quotation marks fifteen separate times.*

"I believe there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Market Hypothesis." (Michael Jensen, 1978)

"In finance, the efficient-markets hypothesis asserts that financial markets are 'informationally efficient'. In consequence of this, one cannot consistently achieve returns in excess of the average market returns, on a risk-adjusted basis, given the information available at the time the investment is made." -- Wikipedia

Linking Concepts Through Pareto Efficiency

- Pareto efficiency in financial markets brings out what we call the "Central Paradox of Active Management"

- *All active managers must believe their future returns will be above benchmark (or peer group average) in order to rationally pursue active management, yet it is axiomatically true that roughly half of active managers must produce below average results.*

- Alternatively we could believe in the EMH but that active managers pursue active management to altruistically assist in the price setting mechanism of markets, in order to improve capital allocation in the economy. I'm skeptical on this one.

A Short Digression on the Long Term

Consider an equation of the form:

$Y = m \log X + b$

Y is decade returns on global bond markets from the Dimson, Marsh, Staunton data set from 1900-2010 (11 observations)

The relationship is nearly linear with a correlation of -.86 ($T > 4$) and R-squared of .74

What is X?

Hint: Author Philip MacDonald

The Era of Quant?

- X is the percentage of the world population killed annually in wars, civil wars, genocides and famines
  - From a proprietary Northfield data set
  - War is expensive, leading to government borrowing and higher yields (negative total returns)
  - If you lend money to two countries who go to war, the loser can't pay and the winner only pays what they were going to pay anyway. There is no upside for lenders.
  - Relationship for global equity markets is also highly negative but not statistically significant with only eleven data points.

- "Between the Second World War to end all wars, and the Third, which by eliminating mankind altogether, will actually do the trick."

  The List of Adrian Messenger

Heterogeneous Investors Do Matter

- Financial markets are full of obvious examples of how investor preferences get worked into asset pricing
  - The difference in yields of taxable and non-taxable bonds in many countries
  - Securitizations of loans where "the sum of the parts is worth more than the whole". Different investors want different maturity structures and a willing to pay more to get what they want.
  - Yield tilted passive equity strategies (Rudd and Clasing, 1982).
- A couple of favorite literature examples:
  - Litzenberger and Ramaswami (1979)
  - Dermody (1997) goes into massive detail on how taxes effect pricing in long/short bond arbitrage http://www.northinfo.com/Documents/101.pdf

What Investor Preferences Might Matter?

- Taxable versus non-taxable entity
- Short horizon versus long horizon consumption plans
- Potential unpredictable needs for immediate liquidity
- Preference for periodic income versus capital appreciation (trading costs and taxes)
- Legal suitability criteria (e.g. prohibition of leverage)
- Sustainability, and ESG considerations
- Risk aversion, and how time variation in risk aversion relates to market returns (surplus wealth levels)
- Home market bias and currency translation risks
- Accumulating wealth or spending down for consumption

Quantifying Preferences Via Analytic Hierarchy

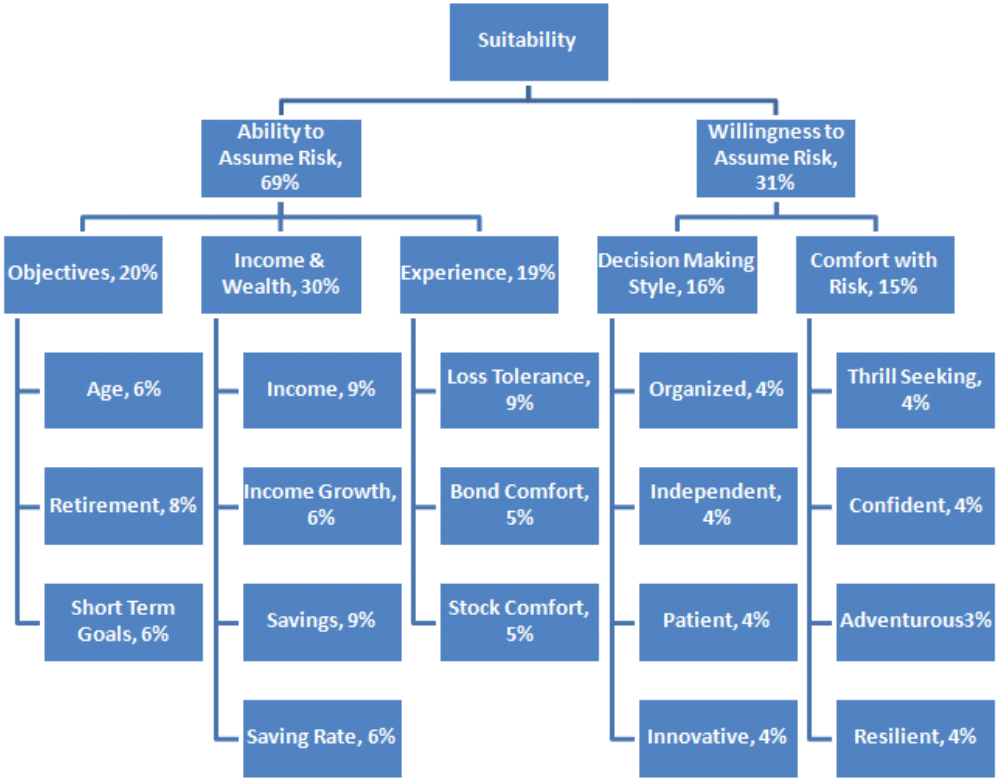
- The basic idea of AHP is to formulate multiple decision criteria in the form of questions, with each question having multiple discrete answers (e.g. a typical multiple choice test).
- For each possible question response (such as an asset class), every solution choice is subjectively evaluated in a pair-wise comparison.
  - For example, we might say that in the absence of other information, that an individual between 25 and 35 years of age is three times better off investing in equities than holding cash.
  - Similarly, we might believe that in the absence of other information that bonds are four times as good an investment as small cap stocks for an individual living on a modest retirement income.
  - By rating all possible pair-wise comparisons possible given the set of questions, answers and solution choices we form a set of numerical matrices that describes all of the relevant information and preferences
  - The eigenvectors of these matrices have special properties that identify optimal solutions.

Asset Allocation and Suitability

- Given the complex objectives of real world investors, AHP would seem to be a natural complement to Markowitz (1952).
  - AHP first proposed as an alternative asset allocation method for investors in Khasari, Kamath and Grieves (1989).
  - The ability of AHP to address investor objectives other than simple return and risk was explored in Bolster, Janjigian and Trahan (1995). This paper first addressed the issue of how to incorporate the legal concept of "suitability" into the portfolio allocation process.
  - Investment services are subject to substantial "suitability" regulation in most countries. The conceptual basis of most of these regulations arises from the "prudent man rule" (Justice Samuel Putnam in 1830)
  - Some countries including the USA (e.g. Dodd-Frank Act 2010) have tightened the regulatory framework for financial institutions dealing with individual investors to create a higher degree of fiduciary responsibility.
  - Saraoglu and Detzler (2002) uses AHP to match retail investor preferences for portfolio management experience and fee levels to mutual funds.

An AHP Illustration

Figure 1



Reproduced from Bolster, P. and S. Warrick, "Matching Investors with Suitable, Optimal and Investable Portfolios", Journal of Wealth Management, 2008.

Bolster and Warrick (2008)

- The most important paper in the AHP finance literature is that of Bolster and Warrick (2008).
  - In this paper which is focused on private wealth investors, AHP and traditional mean-variance are first compared to illustrate the fact that "suitable" portfolios formed using AHP methods are often "close enough" to mean-variance efficient under the criteria established in Jobson (1991).
  - This work then uses process of Black and Litterman (1992) to conform the set of AHP portfolios and the set of portfolios on the adjusted mean-variance efficient frontier until the differences are no longer statistically significant under Jobson test.
  - The paper also combines AHP and mean-variance optimization to conform the portfolios created to real world constraints encountered by retail investors. Such constraints would include minimum dollar amounts that can be invested in particular funds, or the unwillingness of an investor to hold more than a selected number asset classes to be chosen out of a larger set.

A Linear Programming Approach

- Once we have codified investor preferences, we can assign investments attributes as to whether or not they fulfill those investor preferences. We can take the global world wealth portfolio of all defined assets, and the aggregate preferences of all investors, and can identify the marginal investors involved in price setting, solving for the shadow prices (long term return premia) that would make the world wealth portfolio globally optimal for the **current** investor set.

- Once we have the shadow prices (return premia), we can solve for the investment allocation that maximizes the objectives and preferences, and constraints of any particular investor. For a useful related discussion see Scherer and Xu (2007).

- 1998 US patent #5806049A to Northfield associate, professor Chris Petruzzi, http://www.northinfo.com/Documents/115.pdf

Demographics Tying Things Together

- If financial markets are *economically efficient*, then the linear programming process of Petruzzi should be at least approximately true for the current aggregate investor set.
  - At a minimum we can get estimates of the long term asset class return premia which must exist in order to properly compensate for aggregate investor disutility
  - If asset pricing is efficient with respect to the wants and preferences of the current investor set, it logically ignores preferences of investors who do not yet exist.

- If we can use demographic data to predict how the nature of the investor set will evolve over time, we can also predict how the asset return premia should change over time. Long term returns should be predictable.

Demographics and Asset Returns

- An extensive empirical study of the relationship of demographics, economic activity and financial market returns is presented in Arnott and Chavez (FAJ, 2012)
  - They construct models of GDP growth and financial market returns for a large set of countries over 60 years.
  - The key independent variables are the fractions of national population in 15 age group cohorts (easily forecastable over time).
  - They conclude that both long term GDP growth and bond market returns are able to effectively forecasted using demographic data.
  - Results for stock market returns are intuitive but less statistically strong than for bonds.
- Their results are logically consistent with papers such as Cincotta (2004) showing that demographic projections can also predict the probability of high crime rates, and violent civil unrest.

Pro-Active Risk Management?

- If long term returns are materially predictable in an efficient market, it may then be in the financial self interest of large asset owners to reduce market volatility
  - Geometric average returns decrease relative to arithmetic average returns linearly with return variance
  - The current value of global financial markets is about $130 trillion
- Let's assume that large long-term asset owners control half of the total assets, and they chose to donate 3 basis points of their portfolio return to non-government organizations devoted to reducing global conflict (e.g. UNICEF, Red Crescent, Red Cross, Doctors without Borders). FTSE is already campaigning for UNICEF
- If such donations (about $20 Billion annually) could reduce geopolitical conflict by 6.7%, the asset owners financially benefit as lower market volatility would sufficiently improve compound returns by more than the 3 basis points

Conclusions

- The semantic definitions used to describe an "efficient market" rest on the idea that all information has been usefully incorporated in asset prices, and hence asset returns are very hard to predict.
- We assert that for a market to be truly efficient, it must efficiently price assets in terms of current investor preferences and disutility. Methods exist to discover the asset return premia as shadow prices.
- However, asset prices that are efficient for the current investor set, will be inefficient for the investor set of the future. To the extent that the nature and composition of the future investor set is predictable from demographic data, we can predict changes in asset return premia in addition to the current levels of the premia.
- Ample empirical evidence supports our hypothesis and provides sobering food for thought in terms of policies (investment and otherwise) for long term asset owners.