Understanding Benchmarks

Concepts

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Understanding Benchmarks - Concepts

Agenda

1. Assumptions/Definitions
2. Benchmark/Index Examples
3. What Should I Benchmark?
4. How Should I Benchmark?
5. Chocolate Coin/Spreadsheet Workshop
WARNING
ASSUMPTIONS AHEAD
Risk Defined

More things can happen than will happen.

“... It has been philosophically defined by finance professor Elroy Dimson of London Business School this way: “Risk means more things can happen than will happen.” In the end, risk is the gap between what investors think they know and what they end up learning—about their investments, about the financial markets, and about themselves.”

*The scientist who developed the Saturn 5 rocket that launched the first Apollo mission to the moon put it this way: "You want a valve that doesn't leak and you try everything possible to develop one. But the real world provides you with a leaky valve. You have to determine how much leaking you can tolerate." (Obituary of Arthur Rudolph, in The New York Times, January 3, 1996.)

Definitions

“Knowledge is knowing a tomato is a fruit; Wisdom is not putting it in a fruit salad.”

See this useful Microsoft Help page for Microsoft Word on the definition/history of “Lorem Ipsum Dolor Sit Amet Etiam”: https://support.microsoft.com/en-us/ kb/114222
Benchmark

Definitions:

1. **noun**  
   a standard by which something can be measured or judged

2. **noun**  
   a surveyor's mark on a permanent object of predetermined position and elevation used as a reference point

WolframAlpha, [http://www.wolframalpha.com/input/?i=benchmark&rawformassumption=%7B%22C%22,+%22benchmark%22%7D+-%3E+%7B%22Word%22%7D&rawformassumption=%7B%22DPClash%22,+%22FinancialE%22,+%22benchmark%22%7D+-%3E+%7B%22NYSE:BHE%22%7D](http://www.wolframalpha.com/input/?i=benchmark&rawformassumption=%7B%22C%22,+%22benchmark%22%7D+-%3E+%7B%22Word%22%7D&rawformassumption=%7B%22DPClash%22,+%22FinancialE%22,+%22benchmark%22%7D+-%3E+%7B%22NYSE:BHE%22%7D) (December 30, 2016).
Benchmarks ~ Expectations

WE'RE BEATING EXPECTATIONS.
Index

Definitions:

1 noun a numerical scale used to compare variables with one another or with some reference number

2 noun a number or ratio (a value on a scale of measurement) derived from a series of observed facts; can reveal relative changes as a function of time

3 noun a mathematical notation indicating the number of times a quantity is multiplied by itself

4 noun an alphabetical listing of names and topics along with page numbers where they are discussed

5 noun the finger next to the thumb

6 verb list in an index

7 verb provide with an index

8 verb adjust through indexation

(8 meanings)

Benchmark/Index Examples

Benchmark does not necessarily mean an Index

Index
A numerical scale used to compare variables with one another or with some reference number ... can reveal relative changes as a function of time.

Benchmark
A standard by which something can be measured or judged. Can help set expectations.

Not every index serves as a benchmark and not every benchmark is an index.
Benchmarking Fed Funds?

A History of the Fed Funds Rate Since 1979

- Paul Volcker (6'7"
  August 6, 1979 to August 11, 1987
- Alan Greenspan (5'11"
  August 11, 1987 to January 31, 2006
- Ben Bernanke (5'8"
  February 1, 2006 to January 31, 2014
- Janet Yellen (5'0"
  February 1, 2014 to present
Pure Benchmark Example – The Taylor Rule

“The Taylor rule is an equation John Taylor introduced in a 1993 paper that prescribes a value for the federal funds rate—the short-term interest rate targeted by the Federal Open Market Committee (FOMC)—based on the values of inflation and economic slack such as the output gap or unemployment gap.”

\[ i = r^* + \pi + 0.5 (\pi - \pi^*) = 0.5 (y - y^*) \]

Where \( i \) is the nominal federal funds rate, \( r^* \) is the real federal funds rate, \( \pi \) is the rate of inflation, \( \pi^* \) is the target inflation rate, \( y \) is a logarithm of real output, and \( y^* \) is a logarithm of potential output.*

Pure Index Example – Christmas Price Index

The PNC Christmas Price Index® shows the current cost for one set of each of the gifts given in the song "The Twelve Days of Christmas."

TOTAL CHRISTMAS PRICE INDEX (CPI)

$34,363.49  
(+0.7%)

The cost of this year's CPI rose ever so slightly, driven by the price increases for the Turtle Doves due to lack of availability, and wage increases for the Drummers and Pipers.

TRUE COST OF CHRISTMAS IN SONG

$156,507.88  
(+0.7%)

This represents the cumulative cost of all the gifts when you count each repetition in the song (364 gifts)

"CORE" INDEX (EXCLUDING SWANS)

$21,238.49  
(+1.1%)

This version of the CPI removes the most unpredictable gift from the index - the Swans-a-Swimming.

The Big Mac index was invented by The Economist in 1986 as a lighthearted guide to whether currencies are at their “correct” level. It is based on the theory of purchasing-power parity (PPP) ... For example, the average price of a Big Mac in America in July 2016 was $5.04; in China it was only $2.79 at market exchange rates. So the "raw" Big Mac index says that the yuan was undervalued by 45% at that time.

What Should I Benchmark?

California State Code 53600-53610

Word Cloud

Prudence Person Standard

“Investments shall be made with judgment and care, under circumstances then prevailing, which persons of prudence, discretion and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived.”

GFOA Sample Investment Policy, accessed 12/31/16, page 2. Emphasis added.

General Objectives

“The primary objectives, in priority order...

1. Safety
Safety of principal is the foremost objective... The goal will be to mitigate credit risk and interest rate risk.

2. Liquidity
The investment portfolio shall remain sufficiently liquid to meet all operating requirements that may be reasonably anticipated.

3. Return
The investment portfolio shall be designed with the objective of attaining a market rate of return throughout budgetary and economic cycles, taking into account the investment risk constraints of safety and liquidity needs.”

What Measures to Benchmark?

The 5 Points of Suitability

1. Liquidity
   Responsible amount of liquidity to reasonably insure bond gods are neutered.

2. Duration
   Appropriate level of interest rate risk.

3. Credit
   Appropriate level of credit risk.

4. Market Rate of Return
   Earn a market rate of return through budgetary & economic cycles.

5. Legal Investments
   Portfolio holds investments that are legal & in compliance with the Investment Policy Statement.
How Should I Benchmark?

Use an Index or Benchmark Individual Risk/Reward Measures?

**Index**
Find an Index that is closest to your risk/reward preferences and then use it as a proxy for the risk/reward measures you want to benchmark.

**Benchmark**
Determine your preferences for each risk/reward measure and use those as a benchmark.
Markets: Equities = Indices / Bonds = Yields?

Bond Market Indices Overview

Figure 1. Lehman Brothers Global Family of Indices-Index Map as of January 2008


Note: Barclays purchased Lehman Brothers assets (including the indices) after Lehman’s bankruptcy in Sep-08. Barclay’s current guide can be found here: https://index.barcap.com/Home/Guides_and_Factsheets
Bond Market Indices are Rule Based

BASIC PRINCIPLES OF THE LEHMAN BROTHERS INDICES

Although each of the Lehman indices has been constructed to reflect the essential characteristics of the securities and markets it covers, all Lehman indices conform to certain general index construction standards and guidelines.

1) Rule-Based: Our indices are rule-based benchmarks whose composition is reset monthly. To be included in a Lehman index, a security must meet all published eligibility criteria.

Thus, our indices are representative of the marketplace, replicable and reliable. They are unbiased, in that subjective factors, such as Lehman security inventory or whether it managed the underwriting, do not enter into the selection process whatsoever. This is in contrast to portfolio-based indices, in which the performance benchmark is an arbitrarily-selected basket of securities.

The criteria are specified so that, in most cases, a given security can contribute to only one index or group of indices. For example, within the U.S. Aggregate Index, a security cannot be part of both the U.S. Credit Index and the Securitized Index. However, it can be part of both the U.S. Credit Index and the higher-level U.S. Aggregate Index. In both cases, the security is contributing to only one index.

Since launching our first index in 1973, we have expanded our index offerings to new geographic regions and asset classes, meeting the needs of index users with objective rules-based benchmarks. We add new benchmarks to the Global Family of Indices based on three criteria:

- Relevance of an asset class;
- Investor demand for a performance metric; and
- Availability of security-level pricing and analytics to create a rules-based benchmark.
# 1-5Yr Bond Market Indices Overview as of 12/31/16

<table>
<thead>
<tr>
<th>Index Type</th>
<th>Market Value</th>
<th>Yield</th>
<th>Years</th>
<th>ModDur</th>
<th>EffDur</th>
<th>EffCvx</th>
<th># Bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5Yr US Corp A-AAA</td>
<td>804,851</td>
<td>2.1040</td>
<td>2.8610</td>
<td>2.6810</td>
<td>2.6850</td>
<td>0.098</td>
<td>870</td>
</tr>
<tr>
<td>1-5Yr Agency Bullet</td>
<td>284,363</td>
<td>1.4310</td>
<td>2.5150</td>
<td>2.4010</td>
<td>2.4080</td>
<td>0.081</td>
<td>179</td>
</tr>
<tr>
<td>1-5Yr Treasury Call</td>
<td>5,288,918</td>
<td>1.4160</td>
<td>2.8180</td>
<td>2.7000</td>
<td>2.7130</td>
<td>0.101</td>
<td>156</td>
</tr>
</tbody>
</table>

Fixed-income benchmarks embody a great many complex issues ... two issues: the duration problem and the “bums” problem. ...The duration problem is the fact that the duration of the benchmark comes from issuer preferences and is not necessarily the duration that a given investor should hold. The bums (or deadbeats) problem is that the biggest debtors (whether companies, countries, or other entities) have the largest weights in the benchmark.
The duration structure of a cap-weighted bond benchmark—that is, the proportions of bonds in short-, intermediate-, and long-term categories—reflects the maturity or duration preferences of issuers, who are seeking to minimize their (apparent) cost of capital. Investors, however, are not trying to minimize their returns (which are the issuers’ costs of capital) but to maximize returns. Moreover, an investor usually has specific time-horizon preferences that make one duration more advantageous than another. These preferences do not necessarily match those of issuers in the aggregate, whose preferences are reflected in the benchmark. ...

*Because the benchmark duration is a historical accident, the optimal portfolio for an investor with no defined time horizon should be set by that investor’s risk tolerance rather than by matching the duration of the benchmark.*
The “bums” Problem

"Because the issuers who manage to go deepest into debt—the biggest bums—have the largest weights in a cap-weighted benchmark, such a benchmark is not likely to be mean-variance efficient. If you are tracking such a benchmark, when someone issues a security, you have to buy it in proportion to its capitalization weight to minimize tracking error to the benchmark, even if the security is only marginally of high enough quality to make it into the benchmark and even if the size of the issue, and hence its weight in the benchmark, is inordinately large. Such securities would seem to be the most likely to be downgraded or to default. The bums problem applies to countries in an international sovereign bond benchmark just as it does to corporations in a U.S. bond benchmark."
Suitability Benchmark Process

You decide your benchmarks. Don’t let an index decide.

1. Liquidity
Examine historical cash flows to determine optimal liquidity.

2. Interest Rate Risk
Use Treasury Bellwethers to get a “feel” for your interest rate risk preference.

3. Credit Risk
Use credit analysis to determine preference for credit volatility.

4. Market Rate of Return
Use indices or liabilities to determine optimal market rate of return benchmark point/range.
Visualizing the Portfolio versus the Benchmarks

Good visualizations bring together a complex narrative...

Figurative map of Imperial Navy troop losses in the Galactic Civil War, 0 BBY-5ABY

- More Sith
- More Jedi
- 6.8m Imperial troops
- 4.4m
- 4.5m
- Obi-Wan Kenobi dies
- Asteroid hits a Star Destroyer after Imperial victory at Hoth
- Luke Skywalker becomes a Jedi
- Yoda dies
- Remnant Imperial forces retreat to Jakku, reform as First Order
- Anakin Skywalker kills Palpatine, returns to the light side of the Force
- Anakin Skywalker
- Battle of Scarif
- Battle of Yavin
- Death Star destroyed
- Battle of Hoth
- Return of the Jedi
- Battle of Endor
- Destruction of second Death Star and the Imperial fleet

Source: Lucasfilm, Wookieepedia, Star Wars Films

FiveThirtyEight
Visualizing the Portfolio versus the Benchmarks
... and allow relative comparisons across different measures.

Everything we eat both causes and prevents cancer

- Wine
- Tomatoes
- Tea
- Milk
- Eggs
- Corn
- Coffee
- Butter
- Beef

Relative risk of cancer

SOURCE: Schoenfeld and Ioannidis, American Journal of Clinical Nutrition
Webb-o-matic Suitability Benchmark Visualization Analysis

Vertical blue line represents benchmark for each measure.
A Note on Total Return / Market Rate of Return

It is not the return on my investment that I am concerned about; it's the return of my investment

— Will Rogers —
What are your Return Preferences?

Total Return assumes indifference between Price return & Income return.

Total rate of return measures the increase in the investor’s wealth due to both investment income (for example, dividends and interest) and capital gains (both realized and unrealized). The total rate of return implies that a dollar of wealth is equally meaningful to the investor whether that wealth is generated by the secure income from a 90-day Treasury bill or by the unrealized appreciation in the price of a share of common stock.

Most public funds are income oriented and put more weight on income. If you don’t budget gains/losses and aren’t tasked with portfolio growth from investments then you likely have an income preference.

The GIPS standards are typically used when performance information is communicated between an investment firm and prospective institutional investors ... there is no law that an investment firm must create its marketing materials according to the GIPS standards ...

The first thing I get asked about the portfolio is...
Return is last for primary objectives but usually the first question asked...

"...the basic assumption that most institutional investors can outperform the market is false. The institutions are the market. They cannot, as a group, outperform themselves. In fact, given the cost of active management—fees, commissions, and so forth—most investment managers will, over the long term, underperform the overall market. ...

For any one manager to outperform the other professionals, he must be so skillful and so quick that he can regularly catch other professionals making errors—and can systematically exploit those errors faster than other professionals can. ...

The beginning of wisdom for you is to understand that few—if any—major investment organizations will outperform the market averages over long periods of time and that it is very difficult to estimate which managers will outperform. ...

The truly important but not very difficult task to which investment managers and their clients could and should devote themselves involves four steps: (1) understanding the client’s real needs, (2) defining realistic investment objectives that can meet a client’s realistic needs, (3) establishing the right asset mix for each particular portfolio, and (4) developing well-reasoned, sensible investment policies designed to achieve the client’s realistic and specified long-term investment objectives. In this work, success can be easily achieved."


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GFOA Sample IPS

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