



Between the Issues

β 1-Indexing: Reducing Investing Complexity

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Abstract

Using index mutual funds or exchange-traded funds that exactly model desired indexes (β 1-indexing) reduces investing complexity by (1) decreasing the number of sets of assets involved in portfolio construction and thereby (2) decreasing the number of performance attributes that need to be projected. Using β 1-indexing, advisors can devote less time to eccentric asset selection and return projection. β 1-indexing can help financial planning spread to the masses. Complexity is reduced such that one can create useful portfolios using only four to six funds, each one representing a major asset class. Such portfolios are cost efficient for investors and reduce sensitivity to manager risk.

For most complex problems, it helps to reduce the number of factors that have to be decided to reach a reasonable or correct solution. Investment decision-making is one such complex problem. Modern portfolio theory (MPT) offers powerful tools for decision-making. Nevertheless, it involves many complex factors. What I explore here is one approach to dealing with some of this complexity. Specifically, the focus is on asset allocation and expected return projections. Complexity can be reduced to such an extent that it is quite effective to create portfolios using only one fund for each asset class. Such portfolios are cost efficient for investors and less sensitive to manager risk. In addition, I suggest that, today, there is little need for performance bogies.

Actual and forecasted returns might not correspond.¹ A successful long-term financial plan depends on the correspondence of projected returns and actual returns. We would like to know that *if* the forecasted returns are correct, the actual returns will be the same as the forecasted returns. Without this information, our implementation of a financial plan adds uncertainty. β 1-indexing addresses this issue with a simple guideline that uses reasonably available information: β and R-squared. While this guideline is not mechanistic, it does provide objective factors for choosing funds. To help understand the problem, we need to review other aspects of asset allocation and portfolio construction that add complexity.

Asset Allocation

Table 1 illustrates certain aspects of investment decision-making. It is not intended as a recommended portfolio.

Table 1

Asset Class	Asset Class Proxy/ Benchmark	Index Fund	Expected Return	Expected RiskSD	Yield/ Interest	Dividend	Turnover	Holding Limits Min; Max	Correlation
U.S. Large Cap	Standard & Poors 500 TR	VFINX $\beta = 1.00^1$	aa%	bb%	cc%	dd%	ee%	Mn1%; Mx1%	C1
U.S. Small Cap	Russell 2000	NAESX $\beta = 0.90^1$	ff%	gg%	hh%	ii%	jj%	Mn2%; Mx2%	C2
Fixed Income	Lehman Brothers Aggregate Bond	FBIDX $\beta = 0.99^1$	kk%	ll%	mm%	nn%	oo%	Mn3%; Mx3%	C3
International Equity	MSCI EAFE NDIR_D	VDMIX $\beta = 1.01^1$	pp%	qq%	rr%	ss%	tt%	Mn4%; Mx4%	C4
Real Estate	DJWilshire REIT	VGSIX $\beta = 0.97^1$	uu%	vv%	ww%	xx%	yy%	Mn5%; Mx5%	C5
Inflation Hedge	Goldman Sachs Natural Resources	FNARX $\beta = 1.04^1$	aaa%	bbb%	ccc%	ddd%	eee%	Mn6%; Mx6%	C6

1. Funds used are examples and are not recommendations.

Table 1 does not show numeric values for returns (and other factors) specifically to avoid debate about the correctness of those values. This allows us to focus on other issues. There is debate concerning which and how many asset classes are needed for an adequately diversified portfolio. Use of only the first four asset classes listed in Table 1, and excluding cash, is probably adequate for most investors—this keeps them out of assets they do not understand. In any case, Table 1 shows six asset classes; however, β 1-indexing does not prescribe the number of asset classes, nor which asset classes, to use in portfolio construction. Even so, it is clear that the greater the number of asset classes used, the greater the number of factors involved in determining the portfolio return; this contributes to complexity. Investment in each asset class is implemented using actual assets, which introduces even more complexity.

The implementation of an asset class in a real portfolio does not include all of the securities in the asset class; instead, the asset class implementation consists of (subsets of) asset class instances (ACI). For example, the Vanguard 500 Index fund (VFINX) does not include all of the securities in the asset class it is used to represent—that is, U.S. Large Cap (see Table 1, columns 1 and 3). This is also true for many advisor-selected sets of securities. The performance of the asset selection used to represent an asset class is commonly assessed using a bogey.² In Table 1, row 1, the return of the Vanguard 500 Index fund is to be compared with the return forecasted for the Standard & Poors 500 TR index. If these returns differ, a financial plan based on the forecasts for the Standard & Poors 500 TR index, implemented using the Vanguard 500 Index fund, will not be realized. Different types of bogies raise somewhat different issues in this

regard.

The bogies with some portfolio designs are **asset class benchmarks** (ACB) for each asset class. An ACB is used to assess the performance of the set of ACI used within the relevant asset class. The goal of the person/manager being evaluated is to outperform the benchmark. Note the two levels of indirection here: (1) the benchmark is a stand-in for the asset class and (2) the ACI set performance is compared with the benchmark. Indirection adds complexity.

The bogies with other portfolio designs are **asset class proxies** (ACP) for each asset class. An ACP is used to assess the performance of the set of ACI used within the relevant asset class. The goal of the person/manager being evaluated is to match the performance of the proxy. This is often called a “sampling” or “optimization” approach. Note the two levels of indirection here: (1) the proxy is a stand-in for the asset class and (2) the ACI set performance is compared with the proxy. Indirection adds complexity.

There are many approaches to portfolio construction. Proposed here is a specific one: only use index mutual funds or exchange traded funds (ETFs) that exactly model the bogey (see Table 1, row 1). I assume a “replication” approach in this discussion. Further, as used here, “exactly model” and “model” imply that the ETF’s or index mutual fund’s $\beta = 1.00$ (and R-squared = 100%) with respect to the index, by design, and the index does not serve as a benchmark. When these conditions are met, for practical purposes, the distinction between the ACI set and the proxy/benchmark is eliminated. This removes the second level of indirection noted above. For example, in Table 1, row 1, if VFINX’s $\beta = 1.00$ and R-squared = 100% with respect to the Standard & Poors 500 TR index, their performance will be the same. “ACI = ACP = ACB” represents this condition, which is $\beta 1$ -indexing.

Without $\beta 1$ -indexing, there is a logical distinction between the ACI set and the bogey (ACP or ACB—see Table 1, rows 2 through 6, columns 2 and 3). This distinction introduces additional complexity. We have to be concerned with the properties of the ACI set (for example, index mutual fund) as well as the bogey (ACP or ACB). There are also logical problems (such as division) with attributing to $ACI \neq ACP$ the properties of ACP. The general difficulty here is that without $\beta 1$ -indexing we need to determine, project, and monitor the historical and future MPT attributes of at least two distinct sets of assets per asset class ([1] the ACI set and [2] the bogey). Thus, for example, for the “portfolio” in Table 1, there are a minimum of 36 attributes to deal with instead of 18 (see Table 1, columns 4, 5, and 10). This adds complexity to financial plans. This complexity is an effect of the indirection noted above. $\beta 1$ -indexing addresses this indirection issue with respect to portfolio returns.

Portfolio Returns

Popular press recommendations include guidance such as “Keep it simple. You don’t need more than five funds (large U.S. stocks, small U.S. stocks, international stocks, total bond index, and money market) to be well-diversified.”³ Another example: “Building An All-Index Portfolio. With the [index] funds we recommend...Option A: Choose at least one broad market index fund that covers large- to small-cap stocks. Or Option B: Pick one large-cap blend S&P 500 index fund and supplement it with funds that invest in other [equity] indexes....[And then add to A or B]...intermediate-term bond funds.”⁴

The presumed expectation here is that someone following this guidance will get a return that is a weighted average of the returns of the relevant indexes. This expectation is also common for portfolios that are built by advisors. The dual level of indirection noted earlier makes this

expectation somewhat suspect. This is addressed in what follows by identifying certain problems with using proxies or benchmarks.

With MPT, from an investment point of view, making projections for expected return (ER), standard deviation (SD), and other factors is critical. Thus, asset (class) combinations should be structured to make projections as verifiable and uncomplicated as possible at the time they are made.

Some indexes that one might want to use for portfolio construction do not have mutual funds or ETFs that exactly model them. This makes portfolio construction more complex since one must use such indexes only as a benchmark or proxy. For investment advisors attempting β 1-indexing, an index with mutual funds or ETFs that model it has added value over one that does not. A key benefit of using β 1-indexing is that we only have to predict ER, SD, and so on for one set of securities; this avoids the dual levels of indirection that likely occur from recommendations like those cited above.

Predicting ER or SD is a complex set of tasks; having to do that for separate sets of securities (ACI, ACP, and/or ACB), plus attempting to insure they are all the same (in the case of ACP) introduces much complexity that requires justification. The goal using an asset class proxy where $ACI \neq ACP$ is performance that is the same as occurs with β 1-indexing (that is, $ACI = ACP$). Using $ACI \neq ACP$ seems to have no rationale since doing so requires additional time and effort. It also introduces a possible source of predictive error due to this layer of indirection.

Based on goal, using a benchmark implies $ACI \neq ACB$ and $\beta \neq 1$. Based on goal, ACI expected performance is superior to ACB performance. Given that ACI performance is projected, making a second set of projections for ACB seems to have no rationale. One can use β 1-indexing (that is, use a mutual fund or ETF that exactly models the ACI set) and measure the advisor or manager against projected performance, thus eliminating a layer of indirection.

As is well known, as β diverges away from (above or below) 1, an index is less meaningful as a proxy or benchmark. It is also true that with β 1-indexing (that is, $ACI = ACP = ACB$), the meaningfulness of an index as a proxy or benchmark is extinguished; that is, the distinction between the ACP/ACB and the ACI set disappears, thereby removing a layer of indirection. In the past, the use of proxies or benchmarks may have been justified by the cost of investing in a large basket of securities; however, with today's low-cost index mutual funds and ETFs, that time has passed. We can now develop new approaches to asset selection for portfolio implementation.

Asset Selection

An index one might want to use as a stand-in for an asset class might not have a mutual fund or ETF that models it, so the question arises as to how to select a fund to use. One response is to define a new index that permits β 1-indexing using a fund that is available. Another response is simply not to invest in that asset class. Also, one might simply choose a different index that does enable β 1-indexing. In theory, those options are fine, but as a practical matter, currently they do not seem to be the most likely possibilities. It may be that in time β 1-indexing will be possible using the preferred index. In the meantime, if we hark back to the examples at the beginning of the previous section, we can see that one thing missing from those recommendations is an objective discriminator for choice.

Using β and R-squared, a selection guide can be developed: Use the available fund that has β closest to 1.0 with R-squared closest to 100 percent; where available funds have "similar"/same β

and R-squared, depending on the difference, choose the fund with the lowest cost. If for all available funds R-squared is too low for β to be meaningful, bypass using that index or asset class. While this approach is not mechanistic, it does allow one to specify objective factors for choice using reasonably available information. Use of this guideline increases the likelihood that actual returns will match those of the relevant indexes. As a financial advisor, one can determine a single set of portfolio assets that can be used for multiple investors/clients. Further, individual investors can use such a guideline on their own without a deep understanding of β and R-squared.

Conclusion

There are cases in which multi-asset-class β 1-indexing is not appropriate; these relate to special circumstances or needs (for example, an undiversified fixed-income portfolio dictated by client risk tolerance). For most (especially younger) clients, a multi-asset-class β 1-indexing approach, even if not optimal, should be sufficient for long-term investing.⁵ Because only one mutual fund or ETF is needed per asset class, client trading costs are minimized. Additionally, use of β and R-squared provides objective measures for selecting among index funds. Further, a limited and common set of funds can serve a broad range of clients. The asset weighting issue (risk tolerance) is a subject for another discussion; however, investing in “total” market index funds (for example, Russell 3000 or DJ US Total Market Index) tends to mask differences in investor risk tolerance.

This analysis shows that β 1-indexing reduces investing complexity by (1) decreasing the number of sets of assets involved in portfolio construction and thereby (2) decreasing the number of MPT attributes that need to be projected. Using β 1-indexing, investment advisors can devote less time to eccentric asset selection and return projection. Further, it is practical to create useful portfolios using only a limited number of funds, each representing a major asset class. Such portfolios are cost efficient for investors and less sensitive to manager risk. Because of reduced complexity, a β 1-indexing approach can help financial planning spread to the masses in a cost-effective manner.

Endnotes

1. Tokat, Yesim, Nelson Wicas, and Francis M. Kinniry, “The Asset Allocation Debate: a Review and Reconciliation,” *Journal of Financial Planning* 19, 10 (2006): 52–63.
2. A measure or set of measurements one is compared with for performance evaluation.
3. Brenner, Lynn, “How to be a Smart Investor,” *Parade* November 5, 2006: http://www.parade.com/articles/editions/2006/edition_11-05-2006/Smart_Investor/
4. “All Index, All the Time,” *Consumer Reports Money Advisor* 3, 5 (May 2006).
5. Sample Morningstar screen:
Screen Name “Beta = 1.00, R2 >= 99.5”
(Best Fit Beta (3 Year) = 1)
and (Index Funds = Yes)
and (No-Load Funds = Yes)
and (Best Fit R-Squared (3 Year) >= 99.5)
and (Minimum Initial IRA Purchase <= 3000)
and (Expense Ratio <= 0.40)

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