The Role of Factors in Asset Allocation

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KEY FINDINGS

- Investors should allocate to asset classes instead of factors for strategic asset allocation.
- Investors should allocate to factors to improve performance.
- Investors can have it both ways by allocating to asset classes, but in a way that tilts toward preferred factor exposures.

ABSTRACT

For many decades, asset classes have been the main building blocks for constructing portfolios, and, appropriately, they still are. However, in recent years investors increasingly have considered factors as an alternative to asset classes. In some cases, the motivation to substitute factors for asset classes is misguided, but factors can serve a valuable role in portfolio composition. The author discusses how investors should consider factors when constructing portfolios and, in doing so, exposes their misuse as well as their proper role in asset allocation.

TOPICS

*Factor-based models, portfolio construction, performance measurement**

Investors have yet to reach a consensus about the role of factors in asset allocation. Some believe factors should replace asset classes as building blocks for forming strategic portfolios, whereas others believe factors are better deployed tactically to improve portfolio performance. I offer my views about how investors should consider factors and asset classes when forming portfolios. I first describe three types of factors: statistical factors, economic factors, and attribute factors. I then discuss the diversification potential of factors and asset classes and, in doing so, expose three myths about diversification. I next discuss the advantages and disadvantages of factors relative to asset classes as building blocks for forming portfolios. I then discuss how factors can be used to improve portfolio performance. I go on to show how to allocate to asset classes while at the same time tilting a portfolio toward preferred factor exposures. I conclude with a summary.

FACTORS

Factors are groups of securities just as asset classes are. And like asset classes, factors have features that are common to them. With asset classes, the common feature is typically the type of security, such as common stock or a bond. In the case of factors, there are different commonalities depending on the type of factor.

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Statistical Factors

Statistical factors are called principal components or eigenvectors. These factors are linear combinations of securities that explain the variability of returns. The first factor explains the greatest amount of variability. The second is orthogonal to the first and explains the greatest amount of leftover variability.

It may be helpful to visualize a statistical factor. Imagine a three-dimensional scatter plot of the returns of three securities. Now imagine many vectors drawn in different directions through the centroid of the scatter plot. If we were to project the observations perpendicularly onto each of the vectors, the vector with the greatest dispersion of the projected observations would be the first factor—that is, the factor that explains most of the variability of returns across the sample. To identify the second factor, consider a plane passing through the centroid of the scatter plot that is orthogonal to the first factor. The second factor is the vector residing on this plane that has the greatest dispersion across projected observations. We proceed in this fashion to identify all the remaining factors.

We may not be able to associate these statistical factors with observable economic or financial variables. The factor may reflect a combination of several influences that came together in a particular way that is unique to the chosen return sample. In other words, it may merely be a statistical artifact that is unlikely to persist out of sample.

Because statistical factors are difficult to interpret and because their composition changes through time, they are seldom used as components in portfolio construction or as investment vehicles to improve performance. However, they sometimes help investors uncover hidden risk exposures. Moreover, they are worth considering pedagogically because they illustrate an important feature of factors, which is that their constituents should explain the co-movement of returns.

Economic Factors

Economic factors are variables that capture some aspect of economic activity, such as growth, inflation, or employment. Although measuring these variables is straightforward, it is less obvious how to gain exposure to them. They are not usually directly investable; hence, we must replicate them with combinations of securities that will co-move with them—sometimes in the opposite direction, in which case the replicating weight will be negative. Economic factors are useful to investors who have views about future economic performance and how economic performance will affect the performance of securities. Because economic performance varies through time, investors use these factors to make tactical bets.

Attribute Factors

Attributes are features of securities, such as value, size, or quality, that are associated with differences in return. Securities that share similar attributes are considered factors. Investors who allocate to securities with common attributes believe these attributes reflect risk and that, by gaining exposure to them, they will collect a premium for bearing such risk. There has been considerable debate on whether investors should hold a constant, diversified exposure to these factors or attempt to time exposure to them. A new forecasting tool called partial sample regression offers encouraging evidence that investors can successfully anticipate their relative performance.[1]

[1] See Czasonis, Kritzman, and Turkington (2020) for a description of this forecasting technique and how it is applied to forecasting factor returns.

THREE MYTHS OF DIVERSIFICATION

Myth 1: Factors Are Better Diversifiers than Asset Classes

Proponents of factor investing have speciously argued that investors should stratify their investment universe into factors rather than asset classes because factors have greater potential for diversification than asset classes. They motivate this argument by showing correlation matrixes of factors and asset classes. The correlation matrix of factors is populated by negative or near-zero correlations, whereas the correlation matrix of asset classes shows correlations that are significantly positive. These differences in correlations are the basis for their argument that factors offer greater potential for diversification than asset classes. What they fail to disclose, however, is that factor correlations are computed from the returns of factor-replicating groups of securities in which some of the replicating weights are negative. The weights of the asset class components are all positive. Therefore, factors only appear to offer greater potential for diversification than asset classes. It is an unarguable mathematical truth that, given the same underlying universe of securities and the same allocation constraints, it is impossible to regroup securities from asset classes to factors and change the shape or location of the efficient frontier.[2]

Myth 2: Correlations Are Symmetrical

Correlations, as typically measured over the full sample of returns, misrepresent the potential of both factors and asset classes to diversify a portfolio because they fail to distinguish upside returns from downside returns. Investors seek diversification when their portfolio's main growth engine performs poorly. Moreover, upside diversification is undesirable—investors seek unification on the upside. Therefore, to evaluate the relevant diversification potential of factors, as well as asset classes, we must condition our estimate of their correlations on return samples when other important asset classes perform poorly, but it is not straightforward to do so. Correlations estimated from subsamples are biased even if the returns are jointly normally distributed owing to the mathematics of correlations.

These conditional correlations are called exceedance correlations.[3] Here is how to think about them. Consider a scatter plot of the returns of two factors that are jointly normally distributed. Were we to compute the correlation of a segment of this scatter plot below or above a specified threshold, it would be lower than the full-sample correlation because opposing extreme values, which are now excluded, are more highly correlated than observations that are more alike. When we exclude the opposing extreme values in our calculation, the correlation decreases, but this does not suggest that the variables co-move less when the variables' values are below the chosen threshold. To determine whether a factor offers more or less diversification than suggested by its full-sample correlation, we must account for this bias. We do so by first determining the change in the correlation from a full sample to a partial sample, assuming normality and given the same means, standard deviations, and correlation of the empirical full sample. We then compute the empirical difference between the full-sample correlation and the partial-sample correlation. The difference in these differences measures the extent to which an asset class offers more or less diversification than its full-sample correlation indicates.

[2] See Cocoma et al. (2017) for a discussion and numerical demonstration of this issue.
[3] See Longin and Solnik (2001) for a discussion of exceedance correlations.

Myth 3: Exceedance Correlations Should be Double Sorted

The notion that correlations should be conditioned on the direction and magnitude of returns is well established in the literature; see, for example, Ang and Chen (2001); Longin and Solnik (2001); and Chua, Kritzman, and Page (2009). However, these papers suffer from an error in logic. (I confess that I am a co-author of one of these flawed papers.) These papers argued that investors should focus on subsamples of returns in which both assets' returns are below a chosen threshold. This makes no sense. Investors would prefer assets whose returns are positive when the portfolio's most important component performs poorly. If investors only consider observations in which both assets perform poorly, they will overlook instances when one asset's poor performance is offset by the other asset's favorable performance. Therefore, investors should focus on subsamples in which only one of the assets performs poorly, which typically would be the portfolio's main growth engine.[4]

BUILDING BLOCKS: FACTORS OR ASSET CLASSES?

Before I answer this question, it might be useful to consider the characteristics of a good portfolio building block.

Stable Aggregation

The composition of a building block should be stable. Otherwise, it would require continual analysis to ascertain its appropriate composition, and it would demand frequent rebalancing to maintain the appropriate composition. Both efforts are expensive.

Investable

The underlying components of a building block should be directly investible. If they are not, the investor would need to identify a set of replicating securities to track the building block. Replication poses two challenges. First, in addition to the uncertainty surrounding the out-of-sample behavior of the building block itself, the investor is exposed to the uncertainty of the mapping coefficients that define the association between the building block and the replicating securities. Second, the optimal composition of the replicating securities changes through time, thereby exposing the investor to additional rebalancing costs.

Internally Homogeneous

The components within a building block should be like each other. If they are not, the investor imposes an implicit constraint that two or more distinct groupings within the proposed building block must be held according to their weights within the building block. There is nothing to ensure that the weights of distinct groupings within a larger group are efficient. If the proposed building block is disaggregated into separate groupings, the investor is free to weight them in such a way that yields maximum efficiency.

[4] See chapter 6 of Kinlaw, Kritzman, and Turkington (2021) for a more thorough discussion of this topic.

Externally Heterogeneous

Each building block should be sufficiently dissimilar from the other building blocks in a portfolio, as well as linear combinations of other building blocks. If the building blocks are too alike, their redundancy will force the investor to expend unnecessary resources analyzing their expected return and risk properties and searching for the most effective way to invest in them.

Expected Utility

The addition of a building block to a portfolio should raise the portfolio's expected utility. This could occur in two ways. First, inclusion of the building block could increase the portfolio's expected return. Second, its inclusion could lower the portfolio's risk, either because its own risk is low or because it has low correlations (properly measured) with the other building blocks in the portfolio.

Selection Skill

A building block should not require an investor to be able to identify superior investment managers to raise a portfolio's expected utility. It should raise expected utility even if the investor randomly selects investment managers within the building block or accesses the building block passively.

Cost-Effective Access

Investors should be able to commit a meaningful fraction of their portfolios to a building block without paying excessive transaction costs or substantially impairing a portfolio's liquidity.

Let us first consider the merits of factors, given this set of criteria. Factors, whether defined as statistical factors, economic variables, or attributes, are hardly stable. Their composition must be continually re-estimated and rebalanced. Statistical factors and attribute factors are directly investable, but economic factors are not. Factors, for the most part, are internally homogeneous and externally heterogeneous. However, some economic factors are mutually redundant, such as economic growth and employment. In addition, factors should raise the expected utility of a portfolio without the requirement of selection skill; however, it may not be possible to access all factors cost effectively. Statistical factors are as accessible as their constituent securities in aggregate, as are economic factors. Attribute factors, however, might pose a challenge for two reasons. Some of the securities with the target attribute may not be sufficiently liquid.

What about asset classes? Asset classes based on indexes are typically capitalization weighted, so their aggregation is stable except for the small changes that occur when the indexes are reconstituted. Moreover, asset classes are directly investable; hence, they do not require continual re-estimation and rebalancing. Asset classes that are constructed carefully are internally homogeneous and externally heterogeneous—not as much as statistical factors and not quite as much as attribute factors, but more so than many economic factors. Finally, major asset classes are accessible at very low costs.

The most important distinction between factors and asset classes is that asset classes are stable and directly investable, and factors are not. Factors, therefore, introduce both incremental risk because they are measured with error and incremental cost because they must be continually rebalanced. Investors are better served by using asset classes to represent their strategic portfolio weights.

FACTORS AS A SOURCE OF INCREMENTAL RETURN

Having just argued that investors should use asset classes as the building blocks to form portfolios, I now argue that factors could offer attractive opportunities to enhance performance. Some investors are more skillful at anticipating economic performance than anticipating asset class performance. To the extent these investors can reliably map economic variables onto replicating securities portfolios, they may be able to enhance portfolio performance by overlaying economic factor bets on their portfolios.

There is also compelling evidence that attribute factors carry risk premiums. Therefore, either as an overlay or as an active component within the portfolio, investors could improve a portfolio's performance by harvesting these risk premiums. Moreover, researchers have shown that these premiums are time varying and predictable, thereby offering additional opportunity to enhance portfolio performance.[5]

INTEGRATING FACTORS WITH ASSET CLASSES

Suppose you accept my argument that investors should use asset classes as the building blocks to form their portfolios, but they should also consider allocation to factors to enhance a portfolio's performance. Can investors have it both ways? Yes.

The standard framework for constructing efficient portfolios is mean–variance analysis, in which the objective is to maximize expected utility, defined as expected return minus risk aversion times portfolio risk. This process produces an efficient frontier that is composed of portfolios that offer the highest expected returns for given levels of risk. The premise of mean–variance analysis is that investors like return and dislike risk.

I have argued that the assets in this analysis should be asset classes because they provide a more reliable outcome and are less costly to maintain. One could reject my advice and substitute factors for asset classes owing to the belief that certain factor exposures would increase the portfolio's return. But if I am correct, using factors instead of asset classes would be riskier and more costly. We can reconcile these competing interests by simply augmenting the objective function to include an additional term, which is the product of deviation from a factor profile and the factor profile. In other words, we expand our objective function to reflect the fact that we like return, dislike risk, and dislike deviation from a preferred factor profile. We would therefore include the third term as a negative quantity to signify that we are averse to deviating from the factor profile. By using this expanded objective function, we preserve our use of asset classes as building blocks, but in a way that tilts the portfolio toward our preferred factor profile without explicitly investing in unstable and costly factors.[6] Of course, to tilt meaningfully toward our preferred factor profile, we would probably need to include a fairly granular menu of asset classes.

SUMMARY

The role of factors in asset allocation is hardly settled, but we can take several lessons from the literature. First, it is important to distinguish among different types of factors. Statistical factors, which we identify through principal components analysis,

[5] See, for example, Czasonis, Kritzman, and Turkington (2020).

[6] For a thorough discussion of this integrated approach to portfolio construction, see Bergeron, Kritzman, and Sivitsky (2018).

are useful for determining a portfolio's exposure to risk, but they are less suitable for investment because they are difficult to interpret and unstable. Economic factors offer return opportunities for investors who can predict the direction of the economy and translate these predictions into views about asset performance. Attribute factors offer opportunities to harness risk premiums that are not available from asset classes, either through constant exposure to them or by managing a portfolio's exposure to them dynamically.

The diversification potential of factors is a complex topic. It is important to recognize that it is not possible to regroup a universe of securities from asset classes to factors, given the same constraints, and change the efficient frontier. It is also important to focus on a factor or an asset class's diversification potential when diversification is needed, which is when the portfolio's main growth engine performs poorly. Diversifying against favorable returns is hardly helpful. Although this insight is well documented in the literature, some of these studies have mistakenly focused on periods in which both factors or asset classes performed poorly, thereby ignoring periods in which a factor or asset class did provide protection when the portfolio's main growth engine performed poorly.

Investors should use asset classes and not factors as the building blocks of their portfolios because factors are exposed to mapping error, which makes them riskier than asset classes, and because the replicating portfolio must be continually rebalanced, which makes them costly to maintain. Investors should focus on factors to enhance a portfolio's performance either as an overlay to the portfolio or as an active component of the portfolio.

Finally, investors can have it both ways. They can allocate more reliably and more cost effectively to asset classes and, at the same time, tilt a portfolio toward a preferred factor profile without investing in factors. This integrated approach preserves the benefits of using asset classes as a portfolio's building blocks while exploiting the incremental return opportunities offered by factors.

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