Multi-Asset Class Modeling:

Time to box up your traditional asset classes?



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It seems like investment managers everywhere are rushing to put a risk factor spin on their investment processes. You might even be forgiven for thinking you're being left behind if your investment committee papers aren't filled with terminology like "risk factors," "styles," "smart beta" and "alternative risk premia."

But what exactly are the advantages of using risk factors rather than asset classes? Is it time to box up your traditional asset classes and put them in the attic so that one day you can show future generations how we used to manage money? Let's hold that thought for a minute.

This paper discusses the importance of having tools and models that give you useful and actionable ways to understand, manage and communicate the risks in your portfolio. Viewing your portfolio through a risk factor lens does not magically transform or reduce the risk you're exposed to, but it might help with those three key elements of portfolio design – understanding, managing and communicating risk.

Understanding the risks in your portfolio

Models should capture your investment philosophy

It should go without saying that the models and tools used to construct, test and monitor your portfolios should reflect your team's investment philosophy. However, for many teams locked into off-the-shelf software and risk factor definitions this is not the case. Modeling portfolios under these constraints can become an exercise in "box checking" rather than a genuine attempt to better understand the risks in the portfolio.

For models to become a genuine part of the investment process, the inputs and assumptions need to be calibrated to the investment team's own views of the world, not from a "black box." With this in place, the investment team can begin to perform portfolio analysis in real-market scenarios, in real time, that reflect their own unique outlook. Of course, no one has a crystal ball into the future, so the ability to quickly and seamlessly switch between different assumption sets, reflecting different potential economic and market outcomes, is also key.

Look forward, not backward

Unless you expect the future to look exactly like the past, models should be built upon forward-looking relationships rather than historical data-fitting. A risk premia approach to understanding the drivers of asset class returns can help in this sense.

For each asset class or strategy it is possible to decompose returns into three main building blocks: expected inflation, expected real cash, and an asset class risk premium.

The first two of these building blocks together comprise the market "risk-free" rate. Investors typically expect this rate to provide compensation for expected inflation and reward savers for deferring consumption into the future (the real cash element). However, real cash rates in much of the developed world are currently negative, which actually highlights one of the strengths of a forward-looking, risk premiabased approach.

Modeling approaches that focus only on historic asset class returns fail to recognize the impact of changes in the macro environment that supported those returns. A risk premia-based approach explicitly takes such changes into account. In the current macro environment where central banks are suppressing real cash rates to stimulate economic activity, forward-looking, risk premia-based models can incorporate an extended period of depressed real cash rates into their risk-free rate assumption.

Figure 1: The "Risk Free" Rate Through Time

The chart to the right plots US 3-year rolling inflation (as a proxy for inflation expectations), 3-month T-Bills (as the risk-free rate), and the difference between the two as a proxy for the real cash rate. Since the 1980s both inflation expectations and the real cash rate have been falling, making return forecasts based on historical data liable to overestimate future returns.



Source: Federal Reserve Economic Data, Jacobi calculations. Past performance is not a reliable indicator of future performance.

The third key building block under a risk premia approach, the asset class risk premium, is what entices an investor to move out of "risk-free" assets. This is the part where risk factors can play a role.

What are risk factors?

Risk factors are a set of common elements that explain returns across asset classes. Risk factors can help explain why listed equity, credit securities, private equity investments and some real estate assets all tend to do well or poorly at the same time. Each of these asset classes has a significant exposure to a common risk factor that we call the "equity factor". The exact definition of this factor is less important than the ability to model its common impact across asset classes.

A key advantage of the risk factor approach is that it allows you to have intelligent correlations across asset classes where there are multiple return drivers and relationships. For instance, real estate assets and corporate bonds typically display sensitivities to both equity and bond risk factors. Modeling each as a combination of these factors means their simulated returns will consistently reflect underlying influences on the common factors (e.g. "flight to quality" vs "reach for yield"). The factor weights for these asset classes can also be varied over time to reflect changes such as credit quality in the corporate bond portfolio, or leverage in the real estate portfolio, allowing the correlations between asset classes to shift. This ability for correlations to shift overcomes many of the known issues with using static correlation matrices.

What choice of risk factors should you use? The answer depends on your investment philosophy and your portfolio. At the broadest level, a multi-asset investor may derive all the benefits they need from using equity, bond (inflation and term) and currency factors. Investors looking for a more nuanced evaluation of their portfolios may also include alternative risk factors like commodity, value and liquidity factors, amongst others.

Managing the risks in your portfolio

There is little reason to move to a risk factor-based modeling approach, or any other approach for that matter if it does not offer practical benefits for managing portfolio risk. So what advantages does a risk factor approach offer in this regard?

Stress testing and scenario analysis

A risk factor-based approach creates the ability to stress a given factor and see the impact as the stress event flows through each asset class exposed to that factor. For historical stress testing this means that informed portfolio stress estimates can be derived even where specific asset classes in the portfolio don't have a long history of actual data.

It also means that future, or scenario-based stress tests can quickly and easily be constructed. Rather than having to forecast how each asset class might perform relative to each other in a 1 in 100-year event, under a risk factor-based approach the user can focus on a smaller, more easily defined set of factors.

Regime-dependent Modeling

Creating asset class forecasts across multiple economic or market regimes (e.g. low volatility vs high volatility regimes) is easily accomplished via changing the common risk factor linkages. With the correct portfolio design tools, the investor can then easily and seamlessly compare expected portfolio outcomes across a range of economic and market scenarios, even combining them under a regime-switching approach.

Figure 2: Changing Factor Correlations

Consider a simple two-factor example involving equity and bond factors. Let's say in the long run we expect these factors to have a correlation of 0.4 (top matrix), but in a flight to safety event that correlation switches to -0.4 (bottom matrix). The correlations in all assets that are exposed to these factors, and the resulting portfolio distributions, are automatically affected.

	US equity	Global equity	US bonds	Global bonds	Real Estate
US equity	1.0	0.9	0.4	0.3	0.4
Global equity	0.9	1.0	0.4	0.3	0.4
US bonds	0.4	0.4	1.0	0.7	0.3
Global bonds	0.3	0.3	0.7	1.0	0.3
	~ *		0.0	0.0	1.0
Real Estate	0.4	0.4	0.3	0.3	1.0
Real Estate	0.4	0.4	0.3	0.3	1.0
Real Estate	U.4 US equity	0.4 Global equity	U.3 US bonds	0.3 Global bonds	Real Estate
US equity	US equity	0.4 Global equity 0.9	U.3 US bonds -0.4	Global bonds -0.3	Real Estate
Real Estate US equity Global equity	0.4 US equity 1.0 0.9	0.4 Global equity 0.9 1.0	U.3 US bonds -0.4 -0.4	0.3 Global bonds -0.3 -0.3	Real Estate 0.3 0.3

0.7

1.0

0.0

1.0

0.3

0.3

Source: Jacobi. Illustrative Data Only.

Customizing portfolio exposures

Risk factors also allow the investor to develop new and tailored asset classes that match investments in the portfolio, or that are being considered for the portfolio. By way of example, private infrastructure is a common asset class amongst institutional investors, but individual infrastructure programs can look very different. One investor's program might include only regulated assets with secure cashflows (high sensitivity to term and inflation factors), another's might focus on assets exposed to market demand and greenfield development opportunities (high sensitivity to the equity factor), and of course the amount of leverage used in the program can shift the resulting factor exposures as well.

Global bonds

Real Estate

0.3

0.3

These different programs can be easily modeled and tested within a risk factor framework. This in turn can provide valuable insight into the kinds of investments, gearing strategies, or other portfolio elements that should be considered in portfolio construction.

An additional lens on portfolio risk

Building asset class models from factors does not mean that you must do away with the old asset class-based framework altogether. Linking the asset classes to risk factors creates the ability to seamlessly switch between these different views of risk at the total portfolio level. This is especially important in the typical environment where stakeholders are used to seeing risk and portfolio diversification guidelines described in terms of asset classes.

Communicating the risks in your portfolio

The additional lens provided by the risk factor framework can be a powerful tool to engage with stakeholders on the way your team thinks about and manages investment risks. Portfolios that are seemingly diversified by asset class may appear far from it when viewed through the lens of risk factors.

Communicating portfolio risks using risk factors is especially powerful around strategic reviews, or when explaining the rationale for introducing diversifying investments. Investments that might be considered too risky on their own can be shown to be risk-reducing at a total portfolio level when viewed this way.

Figure 3: A Different Way to Communicate Risk

The left panel in the figure below shows the volatility of a "Balanced" portfolio broken out by the contribution from different asset classes. The right panel shows the same portfolio broken out by risk factor. Adding non-equity alternatives becomes an easier message to advance given this second view on risk.



Source: Jacobi. Illustrative Data Only.

Sometimes it is impossible to tell in advance which visualization of portfolio risk will really connect with stakeholders. This makes having tools and models that enable you to switch between visualizations quickly, and respond directly to unanticipated questions, a key advantage for both asset owners and managers.

Conclusion

So back to our original question: is it time to box up our traditional asset classes in favor of risk factors? From a portfolio modeling perspective there are many benefits to adopting a risk factor-based approach. However, for all the benefits that we've outlined in this paper the truth is that asset classes will continue to be the main building blocks in portfolio construction and governance processes for the foreseeable future. After all, while we may think that certain common factors explain asset class returns, it is asset classes that we still invest in to access those factors.

So how should asset allocators approach the portfolio design problem when they're being pulled in these opposite directions? Here are a few suggestions to get you started:

- Design your asset class and risk factor models around your investment philosophy;
- Tailor or customize asset classes and risk factors relevant to your actual portfolio;
- Build capability to switch between the lenses of asset classes and risk factors;
- Look forward not backward when creating models;
- Have the flexibility to change correlations between risk factors or asset classes;
- Create sensible and consistent stress tests and scenarios;
- Build capability to rapidly iterate, test and deploy models as your research evolves; and
- Track all your assumptions to compare, measure and learn over time.

If you are a multi-asset class investor and are interested in risk factor-based modeling and analysis, Jacobi has the solution for you. At Jacobi, we recognize that no two multi-asset investors think about the world the same way, nor have exactly the same investment universe, objectives or constraints. Our cloud-based technology combines powerful modeling processes with professional and interactive visualization tools to deliver a fully customizable solution designed to tackle problems unique to the multi-asset class space.

Jacobi's storyboard technology has its roots in institutional investment management and brings together investment expertise and a market-leading technology platform. Headquartered in San Francisco, the company is led by a team of experienced investment professionals and engineers.

For more information on Jacobi's modeling framework or other tools available within our portfolio modeling and visualization suite, please do not hesitate to contact us.

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