

Q&A

Talking Research

AUGUST 2019

Adding Things Up: Piecing Together a Multi-Factor Quant Portfolio

“When people talk about factors, they can mean all sorts of things, and that can make the subject confusing right from the beginning.”

Phillip Wool, Ph.D., is Head of Investment Solutions at Rayliant Global Advisors.





Investors turning to factor strategies in search of alpha often find themselves looking for answers about this increasingly popular approach. In this Q&A, Doug Gratz, CFA, Rayliant's Director of Institutional Services, spoke with Phillip Wool, Ph.D., the firm's Head of Investment Solutions, to explore the growing spectrum of factors, how some are a natural fit for emerging markets like China, and the perks of employing a multi-factor strategy.

**This Q&A has been edited based on a recorded interview.*

Q: We hear the word “factor” used quite often. Can you explain what factors are?

When people talk about factors, they can mean all sorts of things, and that can make the subject confusing right from the beginning. Generally, when we think of a factor, it ought to be something that helps us to explain returns of a particular asset. Usually that something is a characteristic, like the size of a company or a price-to-earnings ratio.

We can almost think of factors as being interchangeable with concepts like a signal or predictor. That could make more sense, because sometimes when we hear the word “factor”, we think of risk factors; there's the idea that stocks with greater exposure to risk factors should earn higher returns just to compensate us for taking extra risk. But most of the time, when we think about adding a signal to one of our strategies, we do it because we believe it's going to deliver better risk-adjusted returns.

Usually we think these signals are tapping into some sort of behavioral anomaly. That helps us find situations where investors' mistakes have caused prices to deviate from fundamentals—thereby enabling us to buy a stock cheap or avoid an overpriced stock. For the purpose of this conversation, we should think of factors as something we observe that helps us to better predict a stock's future performance.

Q: To illustrate the definition, could you walk us through an example of a factor and how it works?

I mentioned price-to-earnings ratios. That's easy enough to calculate, so we can just use that as an example. Suppose we collect data on the P/E ratios for every firm



in the market and line companies up according to their P/E ratios. Ranked at the bottom would be stocks with low price relative to earnings; we'd say those are cheap companies in some sense. The stocks at the top would have very high price and very low earnings; we'd probably agree those are more expensive stocks.

Now, it turns out—perhaps not surprisingly—that the cheap stocks tend to produce higher returns than the expensive stocks; we'd call that the value effect. We could refer to the valuation ratio, like the P/E ratio, as a value factor. If we build a portfolio that loaded up on cheap stocks and avoided expensive stocks, we might call that a value factor portfolio, and we could call ourselves value factor investors. And as long as cheap stocks continue to outperform expensive stocks, like they've done historically, then that portfolio is going to do better for us than if we simply bought the market.

Q: Is factor investing an inherently passive strategy? Can it be active too?

That example with the P/E ratio, that's definitely on the passive side. Putting that factor to work is maybe a little more difficult than what I just described. We would still have to deal with companies, for example, that had negative earnings. But it's not that challenging to apply something like the P/E ratio as a quant factor strategy.

On the other hand, there are much more complicated factors, for example, something built on a model of investor sentiment or a factor derived from natural language processing of financial statements or social media. Those can be harder to research and develop. They can be more difficult to calculate in real time and can require more frequent trading. It would be fair to say that factor strategies can really run the gamut from passive to active.

Q: You described the value factor. How many factors are there, and where do they come from?

There are hundreds of factors, and they come from all over the place. The value factor can be traced back to the 1930s to Graham and Dodd writing about valuation ratios, useful in valuing firms. But there are dozens and dozens of new factors being published every year in academic journals. Factors are a hot topic, in sell-side research, on stock research blogs, websites, message boards—you name it. Factor research is being written about every day.



“Factors are a hot topic, in sell-side research, on stock research blogs, websites, message boards—you name it.”

If we explored some survey papers written on all the published factor strategies, we'd find that factors range from simple things like P/E ratio to variables measuring, for example, how much media coverage a company receives. Or there's a paper about a factor measuring the influence of a firm's patents, in terms of how frequently those patents are cited by other companies' patent applications. So, researchers are getting very creative over time with what they'll research as candidate investment factors.

Q: Hundreds of potential factors—that sounds overwhelming. How do you narrow down the list of factors to more of a workable portfolio?

It can be overwhelming. And on the one hand, we might think the more factors, the better. But another view suggests there could be such a thing as too many factors. Let's consider factors published in academic journals—and we'll get a bit cynical here. There's an army of finance professors. They have a bunch of research assistants helping them, and they all know that journals won't publish factors that don't work. Readers want to see cool new strategies that produced amazing returns in a backtest.

One approach to publishing loads of papers is to perform a massive number of tests—better, get their research assistants to perform a massive number of tests—and then they run with the ideas that look good in a backtest. Of course, just by chance, some of the nonsense ideas they came up with are going to produce lucky but good backtests, and that's going to lead to publications.

Now that's clearly an extreme view. And I'm kidding around a bit in terms of the way I set it up, because I'm sure that most finance academics are quite skilled and very sincere about their research. But one can see how even well-meaning researchers could succumb, without realizing, to testing one idea after another until something works, and that's going to lead to the same outcome.



If we as investors simply read academic journals and pull factors from published papers, then we have to expect that, among all the legitimate results, there's also going to be a bunch of noise. And that's a bad outcome, because trading on the noise is going to be costly, in terms of trading costs, at least. Then there's also the opportunity cost from not having invested in better stuff.

Q: Given the perils of too many factors, how should an investor choose which factors to use?

First and foremost, I think we want to avoid a somewhat self-delusional data snooping by ceasing to look at returns in a backtest as the principal criterion when we're trying to figure out which investment strategy to adopt. Beyond that, we might almost think of the research process as a checklist, and a signal needs to tick several boxes before we seriously consider it for inclusion in our factor strategy.

So, first we might ask, do we have a strong theoretical basis for understanding whatever relationship we think exists between some signal and a stock's future returns? And that would include why we think the relationship wouldn't already be priced into stocks. That's usually where investor behavior is going to come into play in our analysis.

“We might think of the research process as a checklist; a signal needs to tick several boxes before we seriously consider it for inclusion in our factor strategy.”

In addition to having a good theory and good empirical evidence between the signal and future returns—in other words, in addition to having a strong backtest—we might want to ask ourselves, can we use the data that we have to validate other predictions of the model that we've come up with that have nothing to do with future returns?



For example, suppose I come up with a signal that I think is going to measure a firm's likelihood of committing accounting fraud. I think it's going to be a negative predictor of returns. I run a backtest, and it turns out that that's exactly what it is. Now I could ask myself, does that signal of accounting fraud also predict negative audit opinions, for instance? Does it predict financial restatement? Would it predict regulatory enforcement actions? Those are all things that aren't exactly returns but would also be predicted by a model of accounting fraud. And that would give me more confidence that the signal I've come up with is actually doing what it's expected to do.

In terms of backtests, we also need to think about whether a factor can be implemented in the real world. So how much turnover does it generate? Is it trading small illiquid stocks? How much capacity would the strategy have? Does it generate a lot of tracking error? Those would all be important questions.

The last question I'd ask is, how is that candidate factor going to fit with all the other stuff we're already doing in the strategy? Have we really discovered something new, or is this just a different version of a factor we're already implementing? In which case we might be doubling down on something that's already in the portfolio. So, when we start talking about multi-factor portfolios, that's going to be a really important consideration. In a best-case scenario, we'd find factors that are reasonably independent of one another. Then it's sort of like seeing a stock from different angles, and the combination of views is going to give you a better look at each company.

Those are the sorts of things that I'd be thinking about when adopting a new factor. Not an exhaustive list, but I think I've touched on most of the big ones.

“A multi-factor strategy is like seeing a stock from different angles, and the combination of views is going to give you a better look at each company.”



Q: With portfolio strategists searching for the right factors, do you worry about overcrowding?

Definitely, there's been underperformance over the past year for a number of the most popular factor strategies. Value would be one example of that. Many people have been asking whether part of the reason for the underperformance is overcrowding. And that's leading to diminished returns for these strategies, because you've got a lot of quants loading up on the same factors, and they're trading away whatever mispricing there might have been.

In one sense, I think overcrowding is hard to avoid, because good ideas are obviously going to attract the most capital, and that's going to push prices back toward equilibrium. Clearly, the more effort we put into original research and the higher the quality of that research in all the ways I just mentioned, the greater the barrier to others replicating our strategy.

“An entirely different approach to beating the crowd is to search for markets where less of the trading is done by professionals.”

An entirely different approach to beating the crowd is to search for markets where less of the trading is done by professionals. The preceding Q&A article ([Making the Case for Localized Quant Investing in Emerging Markets](#)) looked at the alpha opportunity that we think exists in emerging markets, such as China, India, South Korea, and Taiwan, among others. Retail traders there not only overlook quant strategies, but actually exhibit many of the behaviors that we think make factors work in the first place.

Q: You mentioned multi-factor. What are the benefits of using multiple factors? Is it better to do that in a single portfolio, or can we combine multiple single-factor portfolios?

I'm a huge proponent of multi-factor, the idea of putting signals—like value, momentum and low-risk, in addition to all the exotic, active stuff we've touched on



before—together into multi-factor portfolios. I can offer a simple rationale for the multi-factor approach in general; then I'd like to suggest something a little deeper about the way Rayliant, in particular, approaches multi-factor.

First, the simple explanation. An obvious benefit of combining factors is reducing risk. As quants, we usually seek to build portfolios that have enough breadth of positions that we avoid concentrated security-specific risk. By the same token, it's important to diversify across alpha sources. What we'd observe, if we looked at factor returns, is that at any given time we'll find some factors underperforming and other factors outperforming—but you'd rarely see all factors underperforming at the same time. So, if we implement not just one, but several factors in tandem, that's going to help us to smooth out what would otherwise be a fairly bumpy ride with just a single factor.

Another way of looking at this—in part, depending on how one implements multi-factor—is in terms of how information from different factors can work together. Earlier, I alluded to each factor giving us a different view of a stock. We can almost think of investing as a puzzle, and each of these signals gives us one piece of the puzzle. So, maybe we start with the edge pieces, and that could be simple stuff like value and momentum. And as we add pieces, including the trickier ones that might take us more time to place, we're going to fill in the picture and things become clearer and clearer.

Our approach to building multi-factor portfolios works in that way. We call it alpha stacking. It allows signals to work together such that, if everything points in the same direction, we're going to have more conviction in making an investment decision.

Q: That sounds like a powerful concept. Could you give us an example of how factors might work together?

An example I like from our China A equity strategy illustrates multi-factor pretty well and also provides insight into how active factor strategies carry over to emerging markets, where I suggested there might be a greater alpha opportunity.

The value factor discussed earlier picks out cheap stocks and casts off expensive stocks. As it turns out, value works very well in emerging markets, because there are a large number of retail investors who tend to go after high-flying growth stocks with exciting stories. They ignore and, consequently, underprice boring companies, especially those that might have experienced some sort of temporary setback in



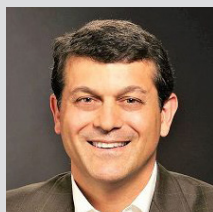
terms of their operations. So, value is definitely one piece of the puzzle in emerging markets like China.

But one of the things we find in China, specifically, that turns out to be very important is state ownership. State-owned enterprises, or SOEs, make up over half of China's market cap. One of the things we've learned about SOEs in our research is that they usually look like the cheapest stocks in the market. SOEs look like value stocks, which is actually sensible if you stop to think about it. What's happening is, investors recognize state-owned companies don't always operate solely to maximize shareholder value—very often they're serving the state's interests—so investors discount the prices of SOEs. Sometimes the value stock that looks like a bargain is in fact cheap for a reason, as with some SOEs, and that's what we call a value trap. So, I would say the value signal's bias toward Chinese SOEs and the potential risk that imposes is the second piece of the puzzle.

Now, to illustrate multi-factor, I'd like to add two more pieces that complete the picture, at least in this simple example. The first is something we refer to as a productivity factor. The idea is to use a bunch of accounting data to measure how efficiently run a company's business is, completely irrespective of price. If an SOE looks cheap relative to other SOEs on the value factor, but it looks highly productive relative to non-state-owned companies on the productivity factor, then it might really be a bargain. It might not be a value trap.

But we needed to use accounting data to measure productivity, and we also know that there's a great deal of accounting manipulation going on in China. So, we have yet another signal that flags companies with honest reporting versus those likely gaming their financial statements. If we find a cheap SOE, and it shows strong productivity and solid accounting quality, that would likely be a good buy. That's an example of alpha stacking where we have a mix of signals that fit together in a fairly complementary way, and that's going to tell us much more about a company than any single factor ever could.

CONTACT US



US AND EUROPE
 Doug Gratz, CFA
 Director, Institutional Services
doug.gratz@rayliant.com



ASIA AND AUSTRALIA
 Broken Tuan, Ph.D.
 Managing Director
broken.tuan@rayliant.com

IMPORTANT INFORMATION

Licensing and Affiliates

Rayliant Global Advisors Limited is not a licensed nor a regulated entity but is affiliated with numerous licensed or regulated subsidiaries (collectively known as “Rayliant”) across several jurisdictions. Any regulated activity may only be conducted through licensed or regulated entities and individuals permitted to do so within the respective jurisdictions. Such affiliates include: (1) Henderson Rowe Limited, a private limited company registered in England and Wales with the company no. 4379340, which is authorized and regulated by the U.K. Financial Conduct Authority, with its registered office at 1 London Street, Reading, Berkshire, RG1 4PN; (2) Rayliant Asset Management Limited, a Hong Kong registered limited company licensed by the Hong Kong Securities and Commissions to conduct Type 4 and Type 9 regulated activities in relation to Professional Investors; (3) Rayliant Asset Management, LLC, a Delaware LLC and United States Registered Investment Adviser; and (4) King Capital Asset Management (上海景资投资管理有限公司), a Shanghai-based asset manager authorized and regulated by the Asset Management Association of China to conduct private fund management business in China.

Capital at Risk

Investment involves risk. The value of investments may fall, as well as rise, and you may not recover the original investment amount.

Accuracy of Information and Limitation of Liability

While reasonable care has been taken to ensure the accuracy of the information as of the date of publication, Rayliant does not give any warranty or representation, expressed or implied, and expressly disclaims liability for any errors and omissions. Information may be subject to change without notice. Rayliant accepts no liability for any loss, indirect or consequential damages, arising from the use of or reliance on this material.

Information Purposes Only

This material is for information only and any securities mentioned herein are for illustration purposes only. It is not intended to be an offer or solicitation for the purchase or sale of any security and should not be construed as an investment advice.

Intellectual Property

Unless stated otherwise, all names, trademarks and logos used in this material are the intellectual property of Rayliant. This material (or a link to this material) may be shared, provided (1) such sharing is free; (2) the material is not altered in any way; and (3) the material is properly and fully attributed to Rayliant.

Past Performance

This material contains data relating to past performance. Past performance is not indicative of future results. Any prediction, projection or forecast is also not indicative of future performance. Performance data are adjusted to reflect the reinvestment of dividends and other income and, except where otherwise stated, are presented on a gross-of-fee basis, without making allowance for trading costs, management fees, or other costs associated with asset management.