FUNDAMENTAL EDGE™

GIUSEPPE PALEOLOGO

INTERVIEW TRANSCRIPT

Brett Caughran

Well, hello, everyone. Rich and I are here with Giuseppe Paleologo, who, on LinkedIn, describes himself as a constant gardener. Jonathan Goldsmith earned the mantle of World's Most Interesting Man via Dos Equis on Twitter recently. Giuseppe, aka Gappy, has earned the mantle of the World's Most Interesting Man in quant finance.

But, on a serious note, Gappy has done a great service for fundamental investors like myself, learning the world of quant finance. When I first became a portfolio manager, managing in a risk model, to learn, I tried to make my way through the Grinold and Kahn textbook and understood about four pages of that.

So, Gappy's really wonderful book, *Advanced Portfolio Management*, was and is a great guide for fundamental investors to learn the world of factor investing and factor risk models, which are increasingly prevalent in the world of institutional asset management.

So, Gappy, I couldn't thank you enough for being with us today. Gappy will go through his full background more, but I will hand over the mic and express, you know, sincere gratitude for your time and efforts today.

Giuseppe Paleologo

All right. Thank you, Brett. Yes, so I titled the deck *Factors 201* because I think that the audience has some knowledge of factors. So this is kind of in the spirit of a guest lecture. It's a little bit of a second and very idiosyncratic take on factor investing.

Okay, let's see, my goals for this hour, hour and a half, are really to have fun together. In this case, you know, I am relying on Rich and Brett to ask questions and to keep the conversation lively.

I would like to start, of course, with the obligatory self-introduction, self-promotion. But, you know, I'd like to start with a very short summary of what I view to be factor investing, factor-based fundamental investing. Then I will cover some questions that are important, especially if you are starting your adventure with factor investing now. And then, I will also give some highly speculative forecasts on what's the future for factor investing.

Okay, so as a warning, I am going to be highly opinionated. I'm not going to give just a course on factor investing. There are sources for that, including in the modules offered by Brett and I will occasionally swear if it's appropriate.

Okay, so let's start with an introduction about… let's talk about me. I studied physics, and then I moved to applied math. My PhD was in management science and engineering, and I have a master's in statistics, general art, operations research. Then I worked as an applied mathematician in the Math Science Department at IBM Research.

I moved into finance because I was a little bit bored. I studied at Axioma, which is a provider of factor models. It's one of the two major providers of factor models. Then I was hired into

Citadel. I worked there a couple of times. In between, I was a quantitative portfolio manager. Then I went to Millennium, and I was the head of enterprise risk. And then, I was called by some random recruiter who told me about a company called HRT. I had never heard about them. Okay, so, and yet, you know, HRT is really an amazing company, an amazing principal trading firm and market maker.

Okay, so I was the CRO there. I relatively recently left HRT about 10 months ago. So, I am serving my non-compete, and at the beginning of November, I start at Balyasny Asset Management as the head of quantitative research.

All right. So, in between all these jobs—well, not all the jobs, but some firms enforce non-competes. In between, I typically try to keep busy by teaching and then I talk to students, especially in this past non-compete. I've been talking to a lot of students and a lot of fintechs. Then, I write books.

One book that I wrote, and it came out about exactly three years ago, it's the one on the left. It's called *Advanced Portfolio Management*. The reason I wrote this book is that I have supported fundamental portfolio managers pretty much for my entire finance career. Even when I was at Axioma, I was answering calls from fundamental portfolio managers all the time. Then at Citadel, I was pulled back in talking to them at Millennium, I have talked to traders at HRT.

I do talk to PMs all the time, both quantitative and fundamental, but originally fundamental. And there is a pattern, right? I get asked always the same questions, in some variants. So, at some point, I said, you know, I have to do something. I have to write basically the very basic stuff—the most simple lessons—and in a way that it can be read in a few sessions by a fundamental portfolio manager.

As Brett was saying, there is this book that came out about 30 years ago. The second edition is 25 years old, by Grinold and Kahn called *Active Portfolio Management*. And it's a very big book. It's actually not an easy read, and it was meant for quantitative PMs anyway. I thought we could do something smaller, simpler, and more to the point.

That book was actually written, in a sense, before, definitely chronologically before factor investing became a thing for fundamental portfolio managers.

So, okay, that's the book. Now, my coordinates are, I have a bookmarks page on Linktree that contains links to most of the things that I have on the internet. For another couple of months, I'm going to be active on X under @ *paleologo* but then when I start working, probably I will reduce heavily my social media activity. I have a page on LinkedIn, where I typically post semi-official announcements like, I don't know, "I'm giving a talk," or something like this.

I am writing another book, by the way, which is called *The Elements of Quantitative Investing*. It's a book that is going to be aimed at a different audience. It's really aimed at quantitative portfolio managers, quantitative researchers, and people working in central

functions in hedge funds and proprietary firms. It's a much more quantitative book, more complex book in a sense. It's really a book for people who will make factor models, who will optimize portfolios, analyze performance, and the like. So, it's more aimed at the makers of technology. Okay, so that's enough.

All right, so let me go to the next slide. And I would like to spend a few slides on really summarizing, but also giving a little bit of a personal take on terms like, you know, "What is factor investing?" "What is quantitative research?" "How do I see their interactions with fundamental investing?"

So, you know, factor investing is not quantitative research. The goal of quantitative research is not to turn you into fundamental PMs. It's not to turn you into bad quantitative PMs. It's to turn you into better fundamental PMs.

That's a very broad goal. Factor investing is a part of quantitative research. It's a tool, a technique. It's something that has been around for about 50 years now, and that might be superseded at some point—I don't think anytime soon—but like everything, you know, it's born and eventually maybe subsumed into a broader technology.

So, and the other thing I wanted to point out is that it's not like more, you know, more cowbells that you're adding to a song. Like, it's not an ingredient that you say, "Well, now we have factors, and we are done." Right? Everybody talks about these damn factors, so there you go. No, it's really a way of thinking. So, I like to say, you know, it's not cooking. It's really chemistry.

Okay? So, you know the difference between cooking and chemistry is Jesse Pinkman versus Walter White in *Breaking Bad*, right? So, you need to know what's behind things in order to make, you know, very powerful methamphetamine. Now, you're not making methamphetamine, I hope, but you're making good portfolios.

So, the goals of quantitative research are two, really. The first one is to help you and your firm as a whole monetize your current investment ideas in the best possible way. And the second goal is to turn you personally into better investors by analyzing your historical track record. So, you basically analyze yourself, and you can understand what you've done well, worse, and how to think about the various degrees of freedom that you have, right, when you invest.

Alright, so history. I cannot talk about factor investing without mentioning Citadel. Factor investing, factors are as old as statistics. Factors are basically linear regression. So if you've taken a linear regression in class, in high school, you know factors.

Factors in finance really have kind of two fathers. One is Stephen Ross, who was at Yale, who published a paper in 1977, I think, called *Arbitrage Pricing Theory*. And the second father is Robert Barro, from whom Barra takes its name, who published some actual factor models, some tables and some data in 1974.

Okay, and this was really the prehistory. These factor models were very, very simple, and they were published once a month, and whatnot. But for fundamental investors, I think that Citadel deserves the credit.

I did find this PDF in an obscure, you know, chat service that I think now is not popular anymore. It was called, I think, *Phynance* with the P-H-Y like physical finance. It was for early quants. There was a link to this PDF.

This PDF is from September 2001. Ken Griffin was 32, and at some point it says, you know, that Ken Griffin wants to conquer the world and he specifically says that he wants to apply the analytical framework to picking stocks. And he said that, "We are great at risk arbitrage, and we have taken a meticulous approach to researching this new business."

Ken Griffin had an early limited partner. His actually first limited partner was a person called Frank Mayer, who had a massive intellectual influence on him because he, it was Mayer who told Griffin, "Don't build a hedge fund. Really build a diversified business, build a platform." And that was a huge intellectual influence. In every public speaking that Ken Griffin does about the history of Citadel, he acknowledges Frank Mayer. Another person that he has sometimes acknowledged publicly and actually is mentioned in this article is Ed Thorp, from whom he took the idea of pass-through fees, which is an essential idea to multi-PMs platform hedge funds.

So, why am I saying this? Because Citadel started as a convertible arb hedge fund and was great. It performed very well. It had a slightly negative year in '94, but you know, it was fantastic. And very early on, Citadel invested in developing startup strategies. They were probably very small by way back then. I don't know how big they were, but James Yeh, who was the Co-Investment Officer of Citadel until recently, was an early employee of Citadel and developed this. So, James Yeh deserves a lot of credit for the development of these ideas in the early history of Citadel. Citadel was really a trailblazer. It took years to refine the process but I cannot express enough how visionary this was.

So, the idea of developing and using factor models for fundamental investing at the time must have been super controversial and probably considered by most PMs wrong, you know, outright wrong, and probably also by most academics wrong. So, just massive credit to this firm. And that approach was refined inside of Citadel, and eventually, it seeped out of Citadel because of natural turnover. And I would say at this point, in a way, it has won. I think that it's become really common practice among a large number of hedge fund platforms, for sure, but also, you know, single-manager hedge funds or monolithic hedge funds.

Okay, so that's for the history. Now, what are the ideas? The ideas behind factor investing are actually very, very simple. The first assumption, the first philosophical assumption underlying factor investing, is that the world is sparse.

Okay, so the fact that the world is sparse means that there are few causes or few drivers behind any major event. So, you don't need to list 1000 reasons why something happens.

Typically, the first two or three reasons are sufficient to explain why a war happens, why a big market or big macro trends happen. The world is sparse because the world is heavy-tailed.

You know, the world is heavy-tailed means that a few terms in everything that you know adds up to something. The few terms, the bigger terms, dominate the sum. This is really the definition of a tail—that, you know, especially when you have large, large values of a sum of something, it's really only a few terms, or even just one term that dominates the whole sum.

If you agree with this premise, then basically you kind of agree with factor modeling. Because factor modeling is a way to reduce the complexity of a large number of investable assets into the sum of two things: a very small set of drivers—things that affect everything a little. There are like 3, 4, 5, 10 things that affect 50,000 assets in the world and then you have a little bit of noise that you cannot describe by this very, very synthetic description of the world.

And this little noise is what we call idiosyncratic return in the language of factor models. So, you know, just to sum up, this belief is that the returns of your universe are the sum of a few pervasive causes, which we call the factor returns, and then there is a little something, which is not correlated to these major causes, which is really the idiosyncratic return specific to the asset.

The second tenet of factor investing is that you don't bet on factors. So, why don't you bet on factors? Really, there are two reasons. The first one, I would say, is that there are other people who are, in a sense, orthogonal to you fundamental investors who are specializing into investing in factors. Right? So, the AQRs of the world, or, I don't know, Arrow Street, LSV, there are a bunch of firms, or even BlackRock, right, that will invest in factors, that will make factor investing possible. So, there is a mandate separation, in a sense.

But there are also other very practical reasons, and I'll mention those specifically. One reason is that even if you did not have a mandate not to invest in factors, most likely you don't want to invest in factors. Why? Because fundamental investors, by their own nature, should chase higher quality returns than factors. So, factor returns tend to be either non-existent, in which case we call them actually non-priced factors. You don't pay a price or get a reward for holding these risky sources of returns or, when they have some return, it's a relatively low return for the risk that you're taking. So, factors tend to have a low Sharpe ratio and so because they have a low Sharpe ratio, and your ideas would probably yield a good Sharpe ratio, it stands to reason that you don't want to invest in those because they're going to contaminate the quality of your portfolio.

All right, the third reason is that, yeah, you're not specialized, you don't know them and so, in general, this brings us to the third principle of factor investing, which is you can actually hedge them out. You can control their risk, and you can focus on what you know best, which is the sources of returns that are specific to a firm or to a small group of firms. And this is the exact opposite of what academics recommend.

Why? Because academics really believe that the sources of excess returns are coming from factors and that idio returns should be diversified away, but they do not have exploitable, persistent, expected returns that can be exploited by portfolio managers. So by telling somebody “Hey, don't invest in factors, invest on idio returns” you're taking a very contrary position, the opposite of what academics would recommend. All right, so I think it's worth mentioning. Are there any questions, by the way, I don't want to talk all the time, and is this sufficiently clear?

Rich Falk-Wallace

Yeah Gappy, just following up on that point, is the reason an academic might object to that kind of thinking sort of the same reason that it might be valuable or worth paying for in the hedge fund context?

In the sense that idiosyncratic returns are diversifiable, and therefore you can generate pure alpha in that sense, whereas factors are not diversifiable, and therefore, even if you were to make money, it's not sort of pure profit in that sense, and therefore, that pure alpha is what people, investors, and LPs want to be paying for. Is that a way to think about it?

Giuseppe Paleologo

Well, I think that whether you want to diversify idiosyncratic P&L or not, it's a function of how you build your portfolio, right? So, you can build a portfolio to create a factor, in which case you have diversified the idio away and this seemed the natural avenue to academics. I honestly don’t think that academics were necessarily thinking about - I don’t think they were - I think that they were not seriously considering the possibility that you could make money by researching individual firms.

You know, I think that it’s natural for academics to search for a general explanation and to accept that there is a skill or art that somebody could be so smart that they can forecast or, you know, or identify trends in stocks. Probably, it’s not something... it’s a very, very strong statement. It’s an alternative statement. The null is: nobody knows anything and so, you want to diversify away, but you can construct a portfolio that diversifies idio, and that, by definition, is a factor portfolio. If it’s a good factor portfolio, that factor portfolio will make you some money.

Or alternatively, you can create a portfolio where there are no factor exposures, and so the idio, by construction, is not diversified. And that is exactly what the fundamental portfolio manager does with their portfolio.

Okay, so not all portfolios are diversified. That’s what I want to make clear.

Rich Falk-Wallace

And, you know, still responding to that sort of academic question, when you look at hit rates in any of these places, it’s very rare to find a hit rate on fund - on idiosyncratic P&L, that’s greater than, let’s say, 55-56% and maybe the average is in the low 50s.

Does that... do you view that as sort of speaking to the fact that some of that academic or efficiency argument is at least close to true, or somewhat reasonable for like the general law formation? Or how do you think about that?

Rich Falk-Wallace

Okay, so I would say first, if you have a hit rate of 55% and, you know, a reasonably large portfolio, that's crazy high. Nobody does have a hit rate of 55%.

I would- I will not name names, but I once interviewed with a firm that is not alive any longer. This firm had launched and had a very good first year, with a 20-plus percent that first year. It was a fundamental firm that had a relatively narrow portfolio. We're talking about 300-400 stocks and relatively low turnover.

I was talking to them about being a QR person, and we were talking. I was doing some back-of-the-envelope math, and I asked them. I asked the managing director, "But wait a second, if what you're saying is true, your hit rate has to be 65%."

And the person told me, "And we have that." Once he told me, "And we have that," I knew that they would not be in business for long. Because they didn't know what they didn't know. They didn't have previous experience in fundamental — the firm had a different background.

The fact that they took this number as credible and sustainable for their business told me that they didn't know what they didn't know and as a matter of fact, the second year, they lost 25% and shut down the fund.

So, this is a long-winded answer to say, if you have a hit rate on a diversified portfolio, let's say across multiple PMs, of 52%, you are going to do just amazingly well. Okay, amazingly well. So, and maybe prima facie to an academic, seeing a 52% hit rate confirms that you cannot have skills in idio, but I think that even they would realize, after doing a little bit of calculations, that having 52% would completely refute the efficient market hypothesis because you can have very good risk-adjusted performance.

So, I am not into second-guessing the motives for designing a theory. I think that as a first draft, the APT made a lot of sense. It's elegant, it's simple, it's asymptotically making a lot of sense but in practice, ultimately, this is an empirical discipline, right? And empirically, I think we can say safely that they were proven wrong— the academics were proven wrong.

Brett Caughran

And Gappy, I had a question on that slide. I find the argument to bet on what's left to be very intellectually satisfying.

In practice, for many single-manager hedge funds, for example, say your classic kind of Tiger portfolio construction—50 net, 250 gross—the pushback may be, well, if I distill my portfolio down to just the idio, my actual return isn't compelling enough.

That actually getting to that 10-15-20% return target can require throwing some beta and throwing some momentum in there, whereas the market-neutral, multi-strategy firm tends to run higher levels of leverage—4, 5, 6, 100% or more on gross—to be able to turn that return on gross, that tight idio, into reasonable equity returns.

How much of this argument is portable outside of that kind of high-gross portfolio construction world in your mind?

Giuseppe Paleologo

So, I would say this, right? First of all, we should, I think, start from the realization that, you know, these strategies do not happen in a vacuum. Okay, a strategy is a product, and you sell the product to a client, and the client has different risk appetites and, you know, different goals in their life.

So, a Tiger Cub and a, let's say, Citadel may even sell to overlapping clients, but they serve, you know, different needs for the client. When I buy a Tiger Cub, I really want to have the highest compound growth possible from the fund. Okay, so I basically want to maximize my P&L generated, my total return from this fund.

I can tolerate a low Sharpe, which these funds have, but I want to have very high absolute returns. All right, so this is the risk profile of a Tiger Cub limited partner.

When a limited partner invests in Citadel, Millennium, Balyasny, ExodusPoint, and so on, what I really want is a fund, a source of returns that is better than SOFR, let's say twice as good as SOFR, with zero correlation to fixed income, right? And with a Sharpe that is correspondingly higher.

The model goes for a hedge fund with equity-like returns and bond-like risk. All right, so it's a very different risk profile. I am looking at market-neutral returns as a very attractive substitute to fixed income, to bonds.

All right, so if you go to a Tiger cub and say, "Well, you should be market-neutral," you're essentially kind of destroying their market proposition, and it will not work. Period.

Okay, so I would say it's not possible to just port the market-neutral approach as it is. There is, however, a second argument that you could ask yourself as a limited partner, which is: Why do I have to invest in a Tiger Cub when I can get similar results or better results with a slightly levered market index and a market-neutral portfolio?

I will leave this to the limited partners out there to decide what they want to do. My personal viewpoint is that there is no compelling reason nowadays to buy beta from a hedge fund. I don't see it.

Okay. However, now the Tiger Cub could say, "We actually need, by the way we construct our portfolio, to be long the market." And there are good reasons for that. We could go into details.

For example, one reason is we do not want to have leverage, or we want to have minimal leverage, because we want to be able to withstand the distress of the market and stay in our positions, even if things go to hell. And to do that, you need to have, you know, very minimal leverage in your portfolio.

Yeah. So, these are good points, all right. So, you could argue these things more or less, but I could also argue the opposite. You know, a Tiger cub is unlevered, but has an effective breadth of 20 positions, and they're massively illiquid and as a limited partner, I don't want to invest in a portfolio that takes me six months to liquidate if I need to.

Okay, so it's a complicated equation, right? But I would say this, and on this, I have relatively strong conviction. Tiger Cubs are the last —the Alamo— of non-factor investing.

I had a friend who worked at a Tiger Cub. Again, we're not going to mention names. A funny thing is that he was mentioning you could use log returns at some point, and the portfolio manager or whoever told him, "We do not use logarithms in this firm. They're dangerous."

Which I find like a very funny thing to say, but they didn't even compute the Sharpe ratio. The Tiger Cub in question did not even want to compute the Sharpe ratio.

Okay, let's look at the numbers. So, we said Tiger Cubs want to basically maximize the P&L that they generate for their limited partners. Who has generated the highest P&L out of all hedge funds? Citadel, which is strictly risk neutral. Then you have Millennium, which is as risk neutral as Citadel, even though they don't mandate it super strictly, but they are risk neutral. Then you have D.E. Shaw, then you have BAM, I think and you have other firms, other platforms. Then you have Lone Pine. I think Lone Pine has $20 billion of P&L generated. There are lots of Tiger Cubs and grand-cubs that, in the meantime, have closed shop.

Whereas, there are relatively few market-neutral firms that have closed shop. My again, subjective belief is that if Tiger cubs don't adapt to having measures like Sharpe ratio, hit rate, like a scientific approach to execution, sizing, diversification, and so on, they are destined to become extinct. It's just a matter of time.

You know, everybody will end up like a Tiger Global. Everybody will be a Melvin. Okay, Melvin, I would argue, went down because their portfolio construction was not careful enough. I'm sure that there will be a Melvin alumnus listening to this talk and will send me an anonymous email, but you know, you don't want to be concentrated on your short. That's like, I would say, portfolio construction 101. Concentration, especially on the short side, needs to be managed very carefully.

So, eventually, they will be beaten. Eventually, they will die. It's just a matter of time. The reason that they don't die that quickly is that the number of ideas they have—their turnover of ideas—is very slow. When you have 10 big ideas or 20 big ideas in your whole career as a hedge fund, it's impossible to determine skill from luck.

To tell skill from luck. And this is my argument to the LPs, right? If I had to talk to LPs, if I had to talk to the general managers of Tiger Cubs and very concentrated funds, I would say, you know, not necessarily, "Buy my book," but, you know, "Get to learn the other side of the story and get the most out of it, because it's just a matter of time, and you will die."

You know, you will die rich, but you will die. And, you know, do you want that? I don't know.

So, this is my subjective belief. The trend and the intellectual argument, I think, has been won in favor of factor investing, and in general, the merging, the collaboration between quantitative research and fundamental investors.

And people who still think that they could be, you know, a Bloomberg terminal and a dog and will become rich? Good luck to them. All right.

Brett Caughran

Thank you for a very thoughtful response, Gappy.

Giuseppe Paleologo

Okay. And again, I expect some pushback from people listening to this, but you know, guest speaker, so… all right, so let's go back to the summary of what I think makes factor investing. The first thing is, factors do exist, and as I was mentioning, ignore them at your peril.

So, what are reliably factors that exist? Right? So we have market, of course, we have volatility and beta as additional factors that are highly correlated to market but they are not the same thing over a longer period of time. You have value and growth, of course. You have the technical factors like momentum—long term, medium term, even very short-term reversal. So these are definitely factors.

Crowding is kind of a factor, and all these factors, maybe we'll talk more about crowding later, if we have Q&A but, you know, in general, these are factors. They affect all your stocks and they affect your portfolio. So, you want to look at exposures for these factors and the other thing is, believe the predicted volatility that's coming from these factors. So, a factor model gives you as an output, the volatility of your portfolio, but also gives you exposures and exposures are useful because they allow you to think in terms of scenarios.

What happens if momentum crashes by 8%, like, I don't know, it happened after the 2020 election, right? Was that in December? I don't remember exactly the date. But, you know, you can think in terms of scenarios once you have your exposures.

So, predicted volatility is coming from risk models, and scenarios come from your knowledge of factors and from your exposures and your ability to recognize patterns.

Okay, so you start looking at the time series of a factor, and you know that some factors have specific behaviors, and you pay attention to them. As an example, I see that there is

low turnover in my sector. Everybody has the same thesis so you have crowding and you are asking, “What’s the worst-case crowding loss that I could have in my sector?” For example, in 2016, energy, right? Or 2018, the whole market. You know, those were losses due to crowding.

Another prescription is, you know, think like a quant, which doesn’t mean to be a quant portfolio manager but, you know, you have to think in terms of these numbers, and you don’t need to, you know, you don’t need to have a PhD. The math is very, very simple, and many people already think in these terms. So, it’s not a major process of acculturation to be able to do this.

And again, what are the basic ideas? There are a few pervasive drivers. Diversification matters. Know your edge and hedge the rest, which is, again, do what you do best, and the model will allow you to understand what you don’t know very well and to control it. And then think in terms of scenarios, which means think about your current portfolio and what can happen to the portfolio under adverse scenarios.

If you think about the worst case, then the best case will take care of itself. By the way, this statement—if you take care of the worst case, the best case will take care of itself—I heard it from a famous software engineer, not an investor, but I really like the idea. That’s very Buffett, and if you want, it’s a very risk-fundamental philosophy of risk management, right? If you take care of the worst case, don’t worry. The best case will be just fine.

Okay, so at the same time, right? Not everything is a factor. So, it’s also very important to recognize the limits of factor investing. Factor investing is not a panacea. It’s a model. So, a model is a simplification of reality.

In order to be a factor, you need to be able to reproduce that factor with a portfolio, and that portfolio needs to be heavily diversified. It must have a very low percentage of idiosyncratic returns.

So, there are some things that are just not amenable to being represented by portfolios like this. So, there are things that are not in factor models, like, you know, ESG factors, meme stocks, or passive flow index rebalancing portfolios. Okay? These really are systematic in a way. They are thematic, but they are not easy to capture into factors. If you create an ESG factor, you know, it’s very fashionable, maybe around the oughts or 2010 to 2020, and then it becomes uninteresting. There are meme stocks, right? They are interesting two weeks every decade, and they can kill you, right?

So, these are not factors. If they are not pervasive, and if they are not persistent, even if they are very intuitive, unfortunately, they don’t fit into a factor model. Yet, you can actually represent them as themes, and you can invest them into your portfolios as themes. Right? But just to say, not factors. Okay?

And the other thing is that also, what is idiosyncratic is a little bit in the eye of the beholder. So, what's alpha and what's beta? It's a little bit subjective. You know, you can say that everybody is maybe trading, to some extent, factors, but they are very exotic factors.

All right, so I was mentioning what needs to be done in practice. You know, you need a factor model. All right, you buy one. Typically, don't have the presumption to make your own factor model. It's actually very hard to make a good factor model but, you know, you get a factor model, you get exposures, and you get volatilities. The exposures are a little bit like the medical exam that you're getting from the doctor. There are a gazillion biometric numbers you can get about your body, but in practice, you are happy with 20 numbers that describe your health.

Exposures are a little bit like that, right? When you want to explore actually how your body is composed, you run rays. Right? You do basically a karat test of your body with X-rays or with something else. Exposures are very much the same. You know, you look in some directions, and you take an average of your tissue, and you say, "I take enough averages in different directions." and you say, "Well, now I know more or less how my portfolio behaves." Okay? So, it's an MRI of your portfolio.

And you're going to use volatilities for tactical needs, like on an ongoing basis. You want to have a volatility that is in a certain range. That's okay. It's a very rough number, but it's good enough to size your portfolio. It's definitely much preferable to the GMV of your portfolio. The same way that the dollar beta of your portfolio is much preferable to just the dollar neutrality of your portfolio. They are more informative. They are much better. You're looking at your exposures, especially for the factors that matter to look and to think mentally about worst-case scenarios.

Then, the last thing is understanding what the factors mean. So, there is a very rich interpretation of factors. They behave differently in different environments, and that's part of the commentary that you make about where you are in the cycle.

What are the benefits of factor investing? I think I mentioned most of them at this point, but let me summarize them again.

So, you have first a beautiful principle, which is behind everything that works in life. A car, you know, a computer, anything that is a complex object. In order to design a complex object, you need to separate it into simple parts, and then something works, which is called the separation of concerns in engineering. This is where I can actually look individually at each part without worrying too much about the interaction between these parts. Right? So, in this case, I separate the systematic from the idiosyncratic returns. That's a great benefit. So, I can create a portfolio that is mostly idiosyncratic. So, that's ex-ante.

Then, what I can do is understand ex-post, how did I perform. Right? So, I can have fantastic alpha on paper, and it can suck after the fact or change heavily over time. Factor investing allows me to do performance attribution, which is what a good platform like Arcana does seamlessly for portfolio management.

Risk measurement is also very important. So, you know, better risk management, vol, and exposures. It's something that you get, and as I was mentioning, 20 years ago, pretty much nobody was thinking in these terms.

Today, a lot of people think in these terms and in a few years, everybody will think in these terms because, you know, you win basically in the war of ideas—one funeral at a time. In this case, the funeral is a closure of a hedge fund.

Brett Caughran

Where do you think the LP world, in aggregate, is in terms of this mindset? You know, my general sense is fairly far along but in terms of actually disaggregating return streams from alpha to beta to factor to idio, what inning do you think we are in, in the large pools of institutional capital looking at return streams like this?

Giuseppe Paleologo

I haven't really talked to a ton of PE LPs. It might, especially, you know, I was talking to them a little bit earlier in my career than, you know, I didn't at Millennium, which is highly, highly specialized in its roles. Definitely, I didn't at HRT, which is a prop trading firm. I don't know what will happen in the future. I'd love to know. I think, though, that they tend to be quite sophisticated.

Okay, so I think that more and more slowly, LPs don't want to pay for beta. Right? I think LPs are probably going to be okay with the pass-through, but I think they're going to ask for something different than returns. You know, maybe there could be a quality of return measure, or at least implicitly there is, right? They look at the returns and they say, "Well, historically, you've had a 0.5 beta, even though you're telling me that you're market neutral," right? Stuff like this. And what else, they might have some hurdle. Why not?

You know, in the world of SOFR at 10%, all of a sudden, having an incentive fee on the returns makes no sense. I think a SOFR at 5% is still okay, maybe tolerable, especially if 5% is the upper bound but I think investors, LPs, are becoming more sophisticated and more demanding, for sure.

Okay and also, this goes both ways, in the sense that the unsophisticated LP 20 years ago would have seen a hedge fund with an average compound return of 12% and said, "This is not good enough for me," or even 8%, and said, "This is not good enough for me."

Instead, today, because they are sophisticated, they will say, "Well, this is 8%, this is maybe like the S&P, but it's uncorrelated to the S&P. I'll get it" right? So, it's not all for the worst. I think some things are actually improving for the better.

Shortcomings of Factor Investing

Factor models are too complicated. Okay, so why? The vendors have really perverse incentives and since this is a subjective take, I honestly think that the vendors have not done a good job. Okay, period.

Why have they not done a good job? Because they are adding factors all the time. They're adding sloppy factors. They do not have a proper back-testing or factor model selection procedure. They take the literature at face value, so they will add factors that have been published in the literature, but they are not really factors any longer. I could go on and on. Like, okay, so I mean, everybody still has not only a size factor, but there is a size factor, and there is a mid-cap factor, and I think even academics now recognize that size is not a real factor but good luck with removing it from a factor model, okay? And then there is not just, you know, book-to-price. Of course, there's earnings, there's earning variation but then there's also dividend yield. Maybe there's a dividend yield proxy in a custom model, and so on.

So, that's reason number one. Reason number two, of course, is path dependency. We already had 65 factors, so we cannot go to a 15-factor model. And the last reason is that I think the vendors try to find the product-market fit, and so they're probably overrating the number of factors and factor models. The result is probably worse than the cure.

Secondly, shortcomings, the management of factors is very, very complicated. So, this goes back to the cooking versus chemistry analogy. There is a lot of lore—right, things that people say, but that have not really been thought through very carefully. I'll mention some later but, for example, factor rotations—just-so stories. "You should do this, you should do that." I think that in this case, really thinking from first principles, which is a very fashionable thing to say nowadays, but it's something that people should try to do a little bit more. Okay, there is just too much received wisdom that has no justification whatsoever. This is making the life of a portfolio manager sometimes hellish. Also, we are relatively new, right? So there is some consolidation. There is a selection of ideas, adaptations. So, there is that and then there's the historical fact that the bullshit principle operates. It's implantable. So, somebody says something, and then it takes 10 times the effort to debunk that something. Okay? And so, things are said, and factors are created, and then good luck getting rid of them.

The other thing that I would say is that factor investing is only one part. It's an important part of one part of quantitative research. So, execution, execution research, modeling cost is very challenging and extremely important when you work close to capacity, understanding signal horizon and turnover.

So, portfolio construction is a really complicated problem. It's like an unsolved problem. It's amazing that we are, you know, 70 years almost into mean-variance optimization, and we still don't have received proved working practices that everybody agrees on.

Okay, so signal horizon and turnover and then another area of research is to understand the biases of portfolio managers of which there are many, right? The overtrading, the risk

reduction at the worst possible time, so the lack of timing that is avoidable, and so on—overconfidence in their sizing capabilities. So, these are not strictly speaking factor things. They can be understood better with a factor model, but ultimately, the methods are a little bit different. The fact is factor modeling is a framework, but then you have to fill it up with the proper theory.

Now, we'll go into episodic facts. Okay? And these questions I took from Brett, but I like them, and I wanted to highlight a few of them, and then try to give a more superficial take on a second batch of them, also from Brett, and probably Rich.

So, first question. I think it's a very good question. What has been a successful map for fundamental investors to learn enough quantitatively to master investing in risk models?

So, it's a very good question because we were talking about Tiger Cubs. It's easy to diss on the Tiger Cubs, but you know, you'll have to propose something, right, to them if they want to move into the framework and buy the beautiful tools provided by Rich, or the training provided by Brett, or the book provided by Gappy, whatever. There is an incentive problem here too, right?

Brett Caughran

That sounds like a great team.

Giuseppe Paleologo

I'm saying, you know, the quiet part out loud, all right, so no, like zeroth step, okay, understand and feel Sharpe ratio and information ratio.

As I mentioned, some people really just don't accept it. Okay, I understand why you will not accept it, but because they will say, "Well, that's an intensive measure. It's not an extensive measure." The extensive measure is the P&L that I produce. The intensive measure is the Sharpe ratio that I can compute on this or that sleeve of the portfolio, but that's fine because Sharpe ratio is a necessary condition that helps you decide whether you actually have a shot at introducing a new analyst that starts small, or a new strategy, new asset class, or whatever. So, if you do not have a decent Sharpe ratio on a portfolio of, let's say, a few hundred of millions of dollars of GMV, it's hopeless to deploy that portfolio or that strategy at scale.

Okay, so that's one way to look at it. Also, a low Sharpe ratio is not a bad thing. If you have a low Sharpe ratio on a portfolio of 100 billion dollars, but you have a Sharpe ratio of 0.5, you have an information ratio of 0.5. It's actually a very desirable thing to do, okay, provided that you also integrate this with additional statistics on detail behavior, and, you know, maybe stress stats and some stuff like this.

But, you know, if I had to say, what you want to do first, produce some, you know, Sharpe ratio and to produce some Sharpe ratio, use some predicted vol that's coming from a factor

model. Don't just take the historical Sharpe volatility of your book. Okay, so that's zeroth level.

So then, you know, start moving from just thinking about dollar neutral to market neutral. Okay, so actually, the first step is from non-dollar neutral to dollar neutral, maybe. So, you want to look at the dollar-neutral component of your portfolio, and then you actually look at the market-neutral component of your portfolio.

So, if you are non-dollar neutral, actually, if you're not-market neutral, I think there's one of three things happening. Okay? The first one is, you get paid for beta. Great, congratulations. Right? I want to be in your team because, you know, it's so simple, it's free money.

The second thing is, you're thinking that your alpha, your alpha, your information ratio is so poor that you need to actually have some market exposure. Okay, this sounds a little bit strange to say, but basically, right, the Sharpe ratio of your true alpha and your market exposure… Okay, the Sharpe ratio of the combination of these two things is a function of the sum of the squares of the Sharpe ratios. If you have a very low Sharpe or a very low information ratio on your alphas, then it's logical to increase your market exposure but if you have a very high information ratio, then you don't want to have market exposure because it's actually making your portfolio significantly worse.

All right, so if you don't believe that your alpha is good, then you will say, "I'm going to load up on market." Maybe your alpha is not bad, actually, and you should not load up on market. You should actually- you would be better off being market neutral.

Okay. The other thing that could happen, unfortunately, it does happen, is that you're actually a very good stock picker, you have a high information ratio but then there is this hubris that says, "I want to have, you know, market beta in early 2024 because I'm a genius, and I know exactly when the market is going to turn, and I will actually turn off my market exposure just before then."

So, I am running maybe long and short the market because I think I can time the market. And this is really not going to happen. Like, it's really almost impossible. It's almost impossible, especially for a fundamental PM to time the market.

Okay, so typically, A) you get paid for beta. Great. But if you think about B), I don't think it's true, and C) is really very, very likely not true. So, the only scenario is you get paid for beta. Okay, keep going until you can, but otherwise, be market-neutral. Okay, I strongly believe in this, and it's not an easy step, by the way, but it's an important one. And then gradually, you know, look at the factors that really matter. What are the actually- they're not that many. Then I didn't list them, my fault but, you know, there are not that many factors that really, really matter in life. Okay, there are 68 industry factors, and there are like 18 style factors but really, you don't look at all of them all the time. Okay, especially if you're a sector PM, first of all, you don't look at all the factors, all the sector factors but even the styles, you don't look at all of them, all right?

And the third step is start looking at performance attribution on a daily basis or a weekly basis. Right? Understand that one day, you are actually making money in a stock, and you say, “Well, I am a genius.” And then you look at the performance attribution, and you see that the idiosyncratic P&L of that stock is negative and in reality, you’ve made all your money because the sector has been rallying. Okay, it’s really difficult to accept this, but eventually, it becomes second nature. I have direct experience, right? Many, many analysts and PMs ask you, “Hey, the model tells me, you know, my idio P&L is negative, that my idio P&L on Nvidia is negative, but Nvidia is up, you know, 5% today.” Okay, it’s a process, but eventually, it’s a good process. It’s good to know that Nvidia or that something is going up, not because you have picked it up, but just because the market is rallying.

Okay, so it’s a slow process. We can discuss the individual depth, but it’s possible to do it without having to do a big bang. Okay, it’s a little bit like, you know, you could enable some functions of Arcana so that people are not overwhelmed right at one go. Otherwise, it’s, you know, it’s so information-dense that people will reject it.

Second question: What are the recurring mistakes you have seen fundamental investors make with factor risk models? Okay, so, okay, this is interesting because there are many. All right, so it's not all roses here.

So, first of all, some PMs overtrade to stay within limits. Okay, so there is a, like an execution problem. It becomes difficult to stay within limits, and so they will adjust, and they will deform their ideas to stay within limits. Some PMs do it very naturally. Some PMs suffer a lot, spend too much time, just too much brain damage.

Second, I am quoting a PM here, right? "Hey, I'm not betting on momentum. I am long momentum because of my bottom-up research." All right, this is both true and false. Right? So it’s true that you think about stocks, and you happen to be long momentum, especially if you're a successful PM. Sometimes, you know, momentum just forms into your portfolio magically because you're long the winners and you're short the losers, and it's hard to manage. So, that's the true part. Like, okay, you had the good ideas, and now you’re being rewarded with momentum.

Sometimes, though, it’s false. You know, people are trading into momentum stocks. Right? It’s not that momentum gets created afterwards and sometimes they think they have bottom-up ideas, but really they are betting on the winners, okay, right away. So that’s part of their bottom-up research, and they’re going to suffer. So, they have to be cognizant that they are very long momentum, for example. And you know, they could be punished.

Fourth: Okay, this is one of the bane of everybody who's doing this job for a living: The call from a PM: "This stock has the wrong industry loading."

Okay, now, this is the part of the presentation when I'm really tempted to swear because, okay, so this is also true and false.

Why is it true? Because it is unfortunately true that the GICS loadings, you know, the GICS loadings that are typically used by default by the vendors, are a rough measure of industry ownership. At the same time, it's false because if you think, okay, if the model thinks that your portfolio looks dramatically different, if you are, if I don't know, UBS bank or banking services, or, you know, Walmart is classified in a different industry than Target, if the risk model thinks that a portfolio has dramatically different characteristics, I would say the risk model is wrong. Okay, or at least there is too much faith in the accuracy of the risk model. So, that's number one. And if the parameters to which the portfolio manager has to manage affect even one single industry classification, there is a problem with the inputs to the model.

In general, a single wrong loading does not affect dramatically the profile of a portfolio. Okay, we are not talking about reclassifying Walmart into AI, you know, we are talking about Walmart not being in the same bucket as Target and also, I would say that the 0/1 loadings, yes, they are not perfect. But, you know, keep in mind that the risk model is far from perfect. Far from it, so do not have excessive faith in any model. Okay, even refining the industry loadings will not solve the problem. It will be a placebo most of the time. I just want to, again, not going to name names, okay, but there was at some point an important business owner of a hedge fund who said, "The industry loadings of Barra are all wrong, and you have to do a whole reclassification of the industries by looking at bottom-up revenue data of the components" and this was done. It took six months, and then the performance of the risk model with the reclassified industries was back-tested, and the performance of the new risk model was worse than Barra's risk model.

Okay, so yes, the loadings might have made more sense, but the performance was actually worse. So, okay, these IPO loadings are wrong. That's a subset of the okay. There is no—believe me, there is no way to get the IPO loadings right or wrong. Okay. So the reality is IPOs are just not really amenable to factor modeling unless you actually have some magic ingredients for IPOs. Maybe I've not spent enough time, but it's a diminishing return kind of endeavor. Okay, everybody is unhappy with IPO loadings. Oh, there could be a factor rotation. Didn't you know that? Didn't you know that your momentum exposure is too high? And then, you know, the QR person will call the PM, and to convince the PM to reduce the momentum exposure, they will tell them, "Oh, there could be a rotation happening." "Oh, okay, so I'm going to reduce my momentum exposure." Okay, this is intellectually dishonest. It's telling a story in order to induce a behavior. Nobody can tell or forecast a factor rotation. If you can do this kind of things, here is a bunch of money, and, you know, become a factor investor. It's ultimately detrimental. You know, there is a price to pay for these things. The PM is going to overtrade. It's going to deform their thesis.

Seven: I mentioned this before, but taking the model too seriously and ignoring model error is one problem. All models are wrong; factor models are also approximations of-approximations of reality.

At the other end of the spectrum, there is the complete ignorance of the model, almost sometimes an adversarial behavior. They'll say, "Oh, but you know, the old ways are like

this. You know, my lived experience is this, and so screw you. I am not listening to you" and then again, suffering ensues. Okay? So, these are some of the things that I have seen happening in practice.

Rich Falk-Wallace

Um, Gappy, one question I would have is, you mentioned, you know, earlier, you don't have to have a PhD in math to at least begin to have some use for this kind of stuff.

If you had to say, like, a couple of sort of swag or efficient cuff kind of numbers for people to have in mind, you mentioned, you know, exposure times potential move in a factor. That's one kind of key number. You also kind of hit rates and thinking about things in terms of decomposing, or at least understanding Sharpe ratio in the context of hit rates and breadth and idio.

Are those the kind of key things, and at a minimum, I suppose, understanding what volatility is and what Sharpe ratio means mathematically at some level? Are there any other, or are those kind of the key math pieces to sort of understand, if you're a fundamental portfolio manager? Anything else to just sort of keep on the tip of your tongue as you kind of distill it or simplify it for people?

Giuseppe Paleologo

Yeah, yeah, yeah. So, I would say, I would say this, right? First of all, again, not naming names, but, you know, talk to some really outstanding portfolio managers—really outstanding—and ask them, with an undergrad in engineering, okay? And ask them, but, you know, in their 30s, ask them, "Can you write down on a whiteboard, the definition of correlation?"

They will throw you out of their office. Okay, literally. So, very, very, very smart people, even with a technical background, you know, don't know what correlation is. They definitely don't understand matrix formulations and stuff like this and they shouldn't worry too much about how you define, you know, percentage idio, okay, or computable variance. By the way, all these things can be done in Excel and to me, like a good yardstick to say something is simple enough is, can you do it in Excel? So, you know, Rich, you had, at least at some point, you know, you used to produce a, you know, summary of a concept, create an Excel spreadsheet, and post it on LinkedIn. Right?

I think that, to me, is like a reasonable test, right? If I can do it in Excel, definitely, you know, people can inspect it. Actually, you can do really sophisticated shit in Excel. So maybe, you know, some, you know, some product—okay, everybody, an exposure is a sumproduct, okay, sum of squares and sumproducts. I think everybody understands them. And with that, I think you can say understanding exposures, yes, like they should be able to implement an exposure. Understanding concentration and effective breadth, it's kind of doable. You know, Herfindahl index is something that people can relate to, and they can actually compute it very, very simply with sums of squares.

Actually, you know, so, so breadth, effective breadth, exposures, volatilities but they don't need to compute the volatilities themselves. Okay, yeah, these are really basic concepts, and they're kind of really high school concepts. I wouldn't go as far as saying, "Okay, and this is how you compute the marginal contribution to risk," no, no.

But you need to know, but you need to explain to them, "Okay, if I—if you increase this position, if you grow this position by $1 million, right? How is your dollar vol changing?" Right? And feeling, "What is the dollar vol? What's the annualized dollar vol? And what does it mean?" Okay, okay, a yardstick is okay. You can lose, you know, between two and three times, you know, your annualized dollar vol. How do I move from an annualized dollar vol to a weekly or a single day, you know, dollar vol? These are really, really simple heuristics. I think people can understand them, and they can implement them in a very simple formula in Excel. And, yeah, not much more than this.

Brett Caughran

So, the first point I had in this slide, Gappy, is I owe an apology letter to my former risk management partners—maybe a nice bottle of wine—because I was very guilty of basically all of these. I feel very attacked, but just jokingly.

Kind of like, you know, to get the fundamental pushback, right? To point to, in particular, right? It's like, and this is historically, like, the Tiger Cub mindset of like, "Hey, I want to be long Amazon and I want to be short Bed Bath and Beyond."

Right? I want to be long the winner, short the loser and really, like, ultimately, from the fundamental investor view, the fundamentals are deterministic to that spread. But if you were to put that sort of trade in a risk model, it would look like you're actually making a big factor bet.

Right? And so how, how can you know? How can we come to some sort of agreement, meeting in the middle, that—yes, that is a fundamental bet? Like, the fundamentals are deterministic to the price trend of those two securities, yet in a factor model, that will not look like a highly idiosyncratic trade.

Giuseppe Paleologo

Okay, no, no, but okay. I'll take you at your example. Okay, if I am trading a pair, okay, if I'm trading Amazon and Bed Bath and Beyond, okay, this is not a diversified bet. So, there is a lot of—there is quite a bit of factor. There is a lot of momentum exposure, right? There is relatively little sector exposure. There is a lot of value versus growth exposure, sure. So, there is a lot. There is momentum exposure, right? There is not, let's say, that there is no market exposure, right? Okay, that's great.

Okay, first of all, the value versus growth exposure is not really risky. Number one, okay? The momentum exposure is very risky. but then, because you have effectively a portfolio of two stocks, there is a ton of idio risk in this pair.

Okay, so it's not a diverse- like I'm not only taking a big- you're taking somewhat a momentum bet for sure that you could reproduce very easily and, you know, in a sense, you shouldn't be- you, the portfolio manager, should not be rewarded for that, okay? Because I can recreate this cheaper and better but there is also a big idio bet in that, okay?

There is a big idio bet in that, and that is skill, or that's skill, okay? So, my point would be, like, to the Tiger Cub: you know, that's great that you want to have your 30 positions, you know and great, do it, but be aware that this is how much you're going to lose if momentum, you know, turns against you, okay? And, and sometimes, if your positions are illiquid, you're going to lose 50% in one year, which, in fact, happens, right?

And now you could say, "Well, but I've made $20 billion. I'm, you know, Lone Pine. I've made $20 billion for my investors." Yeah, that's great, but it still really sucks because volatility drag, which we haven't talked about, you know but volatility drag is a real thing, you know, it's—you could do so much better by hedging out some of that momentum. You know, maybe you have, you have extra capacity, you know, you have extra capital. You could create a momentum hedge, a very diversified momentum hedge, which is detracting nothing from your fundamental pair but protects you on the downside.

So, this is the type of reasoning that I would defend. You know, the use for factor investing in a Tiger Cub, right? Okay.

Brett Caughran

Right, right, that makes sense. Thank you.

I found that difficult move from a Tiger Cub to a risk model where it was like, you know, a long Pfizer, short Merck, which is a much tighter pair, factor pair, just works a lot better when you're trying to hit a 75 idio target and so that was one of the kind of consistent challenges I faced, of like, how much to be a pair trader when historically I've been a winner versus loser trader, right? And so blending, blending those two within this factor construct was always kind of very, very difficult to make that transition.

Giuseppe Paleologo

Yeah and Rich, you were at Viking at some point, or some, some other tech fund?

Rich Falk-Wallace

Yeah, I was at Viking before Citadel. I don't think one's the wrong- like, I don't think it's- I think I've come more and more to your perspective on it, Gappy, in terms of intellectual consistency and as a product for the ultimate LP. I think that's the ultimate kind of construct that lands it.

I think, as the pure value mindset, you just come from a training and a background and an understanding that you think about companies as companies, not as tickers, you know, in the sort of Warren Buffett framework but I think, yeah, as you think about it as a product to

the ultimate LP, that's where I think, as you point out, the intellectual argument wins the day.

Giuseppe Paleologo

Yeah and I just want to make sure that if ever a Tiger Cub analyst or PM listens to this, right, that I'm not saying that they have no skill. You know, I say that they will professionally die because they have skill, but they do not monetize it efficiently.

Okay, so there is skill in- I mean, these firms do have skills. These people are highly, highly skilled and have superpowers and maybe they have built, over time, a sufficient moat so that they can afford losing 60% in one year but even Julian Robertson couldn't.

Rich Falk-Wallace

And there's ways people get, if not explicitly factor neutralizing in those contexts, they get closer than maybe that example does, by having more diversification across industries, if that makes sense. Because those, like archetypal Tiger fund types, have just more directional kind of, not just like core style, but also industry bets and spreads and all those kinds of things.

Whereas, you know, if you have a little more diversification, you maybe get to a better kind of middle point or whatever. And as you point out, some of the best stock pickers I've ever met come out of those systems and there's no question about that.

What you're getting at is, you put it in your book this way, which was just that the factors are waves that overshadow the sort of, you know, smaller pieces that are idio. Then, when you add them up, you know, it can get to a different outcome.

So again, I don't think it's, yeah, totally doesn't mean that the people or the investment or the stock picking skill is terrible, it's more to say there's a way to kind of abstract and isolate the pieces of that good stock picking and that's maybe the most important, like, mind shift that people have.

It's actually that focusing on residual or idio returns is actually more fundamental. Like, if you talk to that Tiger Cub group, I think that's the big thing that changes: saying, "Oh, I don't want to be involved in all this statistical mumbo jumbo, down-the-rabbit-hole kind of stuff" and in fact, the point is that actually all of what you're talking about is not factor investing. It's actually focusing people on the elimination of the factor bet. It's the reduction of the factor. When you view residual returns, that's more fundamentally-oriented than someone who actually is mostly a macro trader to look at the aggregate stock price.

I think that's the most compelling argument to that group, actually.

Giuseppe Paleologo

Actually, yeah, I—yeah. Very well said actually, yes, absolutely. It's very, it's very, very true. So, in a way, right? Looking at idio, provided that the model, again, it's not confounding things, right?

Which, again, I really believe that models are really not good. That's, you know, factor models is not a solved problem and that is why, you know, you have every single QR team in every large platform recreating or creating a custom model because they are really not happy with what- and even these models are not great, by the way, because, again, there is a strong path dependency- but factor modeling is not a solved problem.

But once it's solved, it actually shows what really matters to a fundamental investor, right? Because everything else, it's separation of concern. So, you see the value of your thesis for what it's actually worth and not for what it's dressed with. It's dressed with- it's dressed with factors. It's dressed with noise. It's dressed with market and pervasive themes that, you know, you have no skills in, and then you could buy for cheap elsewhere.

Rich Falk-Wallace

Yeah, it's kind of the paradox of this debate that actually, like the Warren Buffett's and the risk quant side, both say the key is to not bet on the macro and they both kind of so strongly agree on that there's sort of this funny, you know, barbelling of who fully agrees to avoid macro thinking.

Just sort of, yeah, there's ultimately, you know, a way to settle these disputes. But it's interesting the way it's argued, yeah.

Giuseppe Paleologo

Yeah, but I think you put it very nicely, actually. So I think that is a very strong argument to win over a hardcore bottom-up stock picker, you know.

How have you seen fundamental investors use factor risk models to their advantage? Okay, I'll go through this relatively quickly but first of all, they don't bet on stuff they don't have an edge on in, so market momentum factors, we discussed this already. They have a better sense of the overall risk that they are taking, the benefits of diversification, they can quantify them. Understand their selection, sizing, timing, skill, and, you know, before removing the factors, these views are somewhat distorted, so that's good. Understand the losses, and again, understand losses that are factor-driven versus idio-driven, and manage them when they happen. Then, something that is not necessarily a factor, but you need factors, and that's idea duration and overtrading. Okay, so you need to, again, reduce the problem to one of idio.

So should fundamental investors be thinking about combining factors into super factors, if at all? Alright, so good question. I will just read the slide and then we can discuss but the skill of a fundamental investor is not in altering factors.

Okay, if they find inadequacies in a model, they should raise the issue with their QR team or, absent that, with the vendors. Okay, don't combine the factors. Don't over-interpret. Don't over-rely on factor models that way. Okay, their skills are, sorry, is single names, okay, so understanding that and themes.

Okay, and themes are not factors. Themes are not factors because they are narrow, so you have, sometimes as little as two stocks, as many as, you know, a few dozen stocks and so they are narrow, and they are transient. So, they are not there forever. You understand, you know, AI or, you know, you understand e-commerce, you understand some hardware trends, right?

You realize they're happening because of supply chain reasons. So this is really why fundamental PMs should not be too afraid of quant PMs, right? Because quant PMs will never be able—at least not, I shouldn't say never, but right now, they're completely unable to get these deep understandings of the themes.

Okay? They will get a summary of the themes from an LLM, but this has absolutely nothing to do with reality. Okay, it's just okay. So, and once they have these things, they can trade them efficiently. So I would say, don't combine factors into super factors and also, another related thing that can happen is that if you have a QR team that's good enough, that team is going to produce theme factors like, there is no tomorrow.

Okay? So, working from home, cyclical, aggressive versus defensive, you know, secular versus secular within sub-sectors, you know, stable versus durable, and the meme versus the low-attention, and the lottery stocks and the Trump stocks and the Harris stocks and the intersection of all of these things and all of a sudden, you have 200 themes and then you start looking at these themes in a dashboard, and you start saying, "Oh, well, this theme has a Sharpe of 3. That's amazing, and actually makes a lot of sense to me." So I'm going to basically create a portfolio that is heavily influenced by this theme. That is bad, okay? That is what I would say, bad process. Okay, so you come up with the theme, you understand the theme, and then maybe you can see how it fares, how it performs, very quickly in a dashboard. Okay? Otherwise, it's a fishing expedition.

Shorter answers. Let's have a round, so these are going to be quick answers.

How do you think about the proper depth of risk models? Okay, that's a good question. Why six factors, or 12 factors, or 20 factors, what, you know, when is the right level to cut off a factor model?

You know, this is like, if you ask even QR people, they will kind of not agree, because there is not even a full agreement on what is a good risk model, so, let alone what is the right number of factors but I will give you my personal view here.

Okay, so there are many characteristics that you can associate with a stock, although not infinitely many but there are many. Okay, you can get them from structured data. You can get them from unstructured data. But, you know, you get a few, maybe hundreds of pieces of

information per stock, and then you can do all sorts of crazy stuff, right? I, you know, I can intersect these stocks, I can ID these characteristics, or I can sum them. I can take a power of size square. Maybe it's an interesting characteristic that becomes mid-cap eventually, right? You can create thousands of factors and the tendency oh by that that you can take ratios, of course, right? Because you take, you know, book-to-price, you don't just take the book value. You normalize. You can normalize by many things. You can normalize by enterprise value., [and] could then normalize by total debt, long-term debt, and so on.

Okay, so what to do? The tendency has been to add factors. Okay, I have a new ratio. I publish a paper, it seems to be good, produces excess returns, I'm adding it to the model, and now you get to 20 style characteristics just like that and I think there is an alternative way, which is you actually make the characteristics more complex, right? And you can use, for example, advanced methods like deep learning or whatever you want but you can come up with more synthetic characteristics, like you could create a single value characteristic that contains dividends, earnings, the variation of dividends, the book-to-price, and other things, right? You can have something that really captures something that is at the intersection of quality, profitability, value, and so on.

That will be a much better factor than the sum of these individual small factors. What you gain is you get a factor instead of five. What you lose is that you get a number that doesn't have a simple definition like book-to-price. Okay, so there is a trade-off to pay. If you are willing to buy into a number that is essentially a value index for the firm and I can make the case that the factor model performs better, you can actually come up with a much more parsimonious model, you know, and so you will have a broadly defensive factor, you will have a crowding factor, and you will have a momentum factor but, you know, momentum and crowding are very related to each other, so there is no right answer here. Vendors want to sell you more factors.

Alright, I think a good QR model, a good QR team, should try to compress the model into fewer factors, provided that the portfolio managers are comfortable with it. So it's complicated, right? It's not a black-and-white answer, unfortunately, but it's good to understand what the trade-offs are: interpretability versus performance. Interpretability versus performance and usability.

Okay, what are your thoughts on good factor leanings or bad factor leanings for a portfolio? Is a 75% idio risk always equivalent?

So I'll try to rephrase the question: If I have 75% idio variance, so a pretty pure portfolio, but my exposure is all momentum, or instead, if I have a mix of, you know, 20 factors contributing to the 75% idio, are they the same?

Intuitively, they are not the same, because if you are making a mistake in the model, but it's distributed across 20 factors, it's not going to affect the performance or the predictive power of the model the same way that you make a single mistake in momentum.

Okay, so I think that the intuition behind this question is model error. You know, model error does not affect two portfolios the same way, because if your portfolio is more diversified across factors, it might be more robust to model error. So it's a little bit complicated, and it's also further complicated by the fact that some factors are very correlated to each other. So that if you make a mistake and you have heavy correlation between factors, that mistake is a more serious mistake than when you have factors that are broadly independent.

Okay, I would say that it's good to look at the factors that matter the most, and it's good if the model is represented. Now, I don't want to get too technical in a way that, let's say, for example, momentum captures all the risk associated with momentum. So if there is some other factor that is collinear to momentum, I am basically putting more of that factor risk onto momentum. Technical thing. But you know, it makes the representation of the model, the meaning of the model, higher.

Okay, how do you think? Sorry, this answer was like, so wishy-washy, but it's a comp. It's a little bit of a technical thing.

Okay, how do you think factor risk management is impacting price discovery and trading volumes in the market? Are certain factors becoming more crashy, and how can we adapt to that change?

Okay, so, okay, so this is not about ideas. It's really a pure empirical question, I think and my belief is that there is no clear evidence whatsoever, that factors are becoming more crashy what are the factors? I mean, becoming more crashy. You could argue crowding and momentum, but they have always been very crashy. So, I don't think that it's easy to tell a trend into these factors but if there is a study, I'm ready to change my mind.

What are your thoughts on a game plan for a drawdown, particularly if the drawdown was driven by non-idio factors? How do responsible PMs adapt their approach in a drawdown?

Well, I think that if you're losing money, you have typically a stop-loss policy, okay? Even if it's not the lay of the land, you know, there is the stop-loss policy you know you have, and the stop-loss policy that you didn't know you had but you find out that you had it after you lose your job for it.

It really sucks, actually. I'm almost in favor of, you know, at least tell me, how am I gonna die. In general, if I have a higher loss in factors, you know, typically, it's easier to remedy that, right? You neutralize your portfolio. That's the first thing you do.

Typically, the game plan is I'm losing money, and I want to see, am I losing money in idio, or am I losing money in factors? If I lose money in factors, I reduce or eliminate the exposure to these factors. Am I losing money in idio? I look at the biggest losers, I reduce the positions of these losers, and so any- so I tighten up the portfolio in terms of factor risk, I reduce the disparity, or I reduce the weight of the big losers and then the third thing I do is I reduce the

portfolio overall, okay, in order to—and sometimes I'm forced to reduce if I have intermediate stop-loss rules.

Okay, that's relatively simple. This is a descriptive answer, but it's also a nice normative heuristic. That's kind of what you want to do.

What does the next generation of factor risk models look like?

Oh, that's a bit of like– okay, do you see a role for an AI LLM in factor-optimizing portfolios? So it's kind of, it's connected to the first question. I think, of course, AI is going to change the way we make factor portfolios, okay? I've already played with it. I have some experience with that. The results are not production-wise, not productionizable yet, but they're very encouraging.

Okay, so I think that I wouldn't even call this AI LLM, I mean, it's kind of a misnomer. Basically, we have these big approximating machines, okay, that we didn't have before. It's the- let's- it's conceptually not that complicated, okay, conceptually it's not that complicated. Engineering-wise, it's super complex but I think it will have an impact in factor models, in basically creating new factors, or simplifying the factors.

Okay, that's something that I believe will happen and, you know, to do this, you need computational power, and that's going to be very interesting, right? You need a significant amount of know-how. Citadel, just to comment on the current thing, the fact of the day, I think Citadel hired a Goldman Sachs CTO, or partner, as head of core technologies.

To me, I interpret that as an interesting investment in having stronger, larger, more scalable platforms for AI, okay, so I think that will be very, very, very transformative. I think that for sure, the biggest transformations are happening in data-rich environments, so very short-term, very short-horizon strategies, because you can use, essentially limit order book data for interestingly, for medium frequency, the data become intrinsically scarce, so there is less of an impact there.

I don't think there will be much of an impact on portfolio construction and optimization. At least, I am missing that. Then the natural first impact is going to be in fundamental research, you know, making people much more productive than having better factor models. I don't think that portfolio construction will be affected in the short term.

What are like, 10 heuristics worth remembering?

Okay, so:

1. Separate idiosyncratic returns from systematic ones. We have discussed this to death.

2. Know your edge, hedge what you don't.

3. Control your losses with stop-loss and liquidity measures. We just discussed it.

4. You don't have timing skills for sure.

5. Measure your sizing skills. Have a friend measure those for you.

6. Size simply and diversify more. We didn't discuss much of this. But, you know, sizing should be, in my view, proportional to or nearly proportional to your expected returns at some horizon. No need to normalize by the factor model variance, which is or idio variance.

7. Measure your alpha decay and trade accordingly. So this is part of non-factor-based QR help.

8. Stress-test your portfolio. We discussed this.

9. Check that your risk tolerance, return objectives, and skills are compatible. If not, join a group of managers. So, what do I mean? I mean that basically, you have some external parameters to your skills, and if this is the set of parameters, results in a pretty good strategy, great. If it doesn't, then you need to be in a structure that diversifies away a little bit of your risk so that you are not out of a job. Right? If you're a single portfolio hedge fund manager, you need to be exceptionally skilled at this.

10. Examine your sources of edge, of which I think there are broadly four classes:

- Short-term single-stock informational advantage, so earnings consensus deltas, incorporating news, and the like.

- Long-term single-stock information advantage, so you understand the fundamental forces we discussed, like Amazon versus Bed Bath and Beyond. This is Class B.

- Then you have things, so you have a short-term cluster stock mean reversion, so you have relative valuation technical divergence. So people do this all the time, right? They see, I don't know, now we like Amazon versus Alibaba. If one outperforms, you do that on the reversion, given the fundamental data.

- And then you have a short-term and long-term cluster stock continuation, like investment themes and sub-sectors. AI, okay, that's Class D.

Okay, so, but one needs to know, what are they good at and when, and in what class, and then size accordingly.

Brett Caughran

I think we got a lot of our questions asked in the interim but Rich, are there any, any kind of closing questions, a few, few questions that we have that we didn't touch on?

Rich Falk-Wallace

No, I think this was great. I think we covered a lot of ground here.

I think, you know, it might even, it might even just be for another time but crowding was one topic that is just a hot topic, maybe more, maybe more than it deserves to be but, it is a hot topic for everybody. Everybody's very focused on it and so, always, I think a good one to ask, if we have, if we have a second on, I would love, Gappy, or sort of how to quantify, where to think about it, what's really important, what's not—that kind of thing?

Giuseppe Paleologo

Yeah, yeah, yeah, no, that's, that's, that's great. That's a great question. So, okay, I need to self-advertise my Linktree page just for a second, because on my Linktree page, there is one bookmark to like, six problems that I think about all the time, and one of them is crowding, but there are five more. So, to any interested party, check that out. It's a presentation.

Okay, so crowding. So, okay, so what are table stakes on crowding? There have been kind of for more than a decade, this right. The rationale has always been this: let's measure crowding before we try to model crowding and how can we measure crowding? Well, short interest typically captures informed investor behavior, because the vast majority of- well, not anymore, probably, but a lot of retail investors are long. So short interest gives you pretty timely information about aggregate information about the shorts and then you take 13-Fs and you have pretty non-timely information, but very disaggregated information about the longs, right? And then throw in, for good measure, something about liquidity and volatility. Mix that up, and you get a crowding measure. So, how much of a stock is consensus?

Okay, so this is a descriptive measure, but I think it's not a particularly good one. Okay, so if you look at the behavior of this crowding measure, you will see, typically, that it behaves like this: that's a positive Sharpe, you know why? Typically, if you join the consensus short, it's okay. Then you can do something a little bit smarter on the short, right, and also on the long. Like, typically, what is a good crowding stock? Like, what the crowded stock on the short is, not just a shorted stock. It's a shorted stock that is a stale shorted stock, right?

Okay, so let's make it a little bit more complicated. You know, there is a whole cottage industry with people adding and refining crowding this way. It's not rocket science, and it's not particularly deep, right? The behavior of this factor is one where it's got positive Sharpe, let's say Sharpe of 1, 1-ish, right? But it's also, it's very skewed, right? So, like momentum, which, by the way, is really due to crowding, but momentum has crashes and crowding has crashes.

So what's a person to do, right? If I trade net crowding, I am basically going to eliminate my alpha, because my alpha as a hedge fund manager typically overlaps with crowding quite a bit. If I keep my current exposure, I'm a sitting duck for big drawdowns.

All right, so it's not that super useful that way. I think that the problem here is that crowding is not a factor. Okay, that's the important thing to say. It's like crowding is not a factor. The assumption underlying factors is that they are exogenous.

Okay, exogenous means that, in reality, they are driven by, in a sense, everything should be macro, to some extent, right? In a sense, everything should repeat. There is a bit of noise that affects everything every day, and that noise repeats day after day. That is the ideal world of a factor. Crowding is just the opposite of this, right? Crowding is endogenous. It feeds upon itself. So it's good to be crowded until something happens that tips the scale, and then everybody does the same thing in the opposite direction.

So the challenge is to realize that crowding comes from the interplay, interaction between agents and so something that in a traditional crowding setting is completely non-actionable, if you can get one level down and condition that information on something, right? That tells you, well, it's not only that crowding is high, it's that the system is fragile, right? Then you have something that's really useful.

So it's a little bit like this, right? The analogy that I like to give is that crowding and crowding losses are a little bit like earthquakes.

Okay, the job of a good seismologist is not to tell you there is going to be an earthquake tomorrow, right? It's going to be that if you are actually building in Japan in this millennium, the probability of your house being destroyed is much, much higher than if you build, let's say, in Central America, I don't know, you know, or maybe in Kansas, something like a non-seismic area.

So I don't predict the earthquake. I just predict the likelihood, the probability of an earthquake, or I can predict if the terrain is becoming, you know, more amenable to the caldera under Wyoming is becoming more active. I don't know if it's going to happen tomorrow, right?

So in a way in an environment that is prone to derisking is a little bit like caldera and you, but you have to have a model, okay? Like plate tectonics, you need to have a model for crowding and we are nowhere close to that.

Okay, so basically, we are in the scenario where I know I'm a sitting duck, but what can I do? What do you want me to do as a PM, right? So I think it's, it's, it's really an open problem. I think that there are probably interesting directions, but it's like research.

Rich Falk-Wallace

Yeah, there are several deep points there, but deserve their own, their own session there, but that's great.

Giuseppe Paleologo

Yeah, but that's a- that's a very important problem

Brett Caughran

Gappy, you've been incredibly generous with your time and knowledge. I think that's kind of a good stopping point and again, just wanted to reiterate our gratitude for the time you spent today, kind of sharing this with us and, you know, sharing this with our current and future students.

So hopefully, we will all avoid the graveyard of the unsuccessful or unaware factor machine and, you know, we're all obviously paying much attention to your books, your writing, and what you're putting out.

Giuseppe Paleologo

And so, yeah, look, I just want to say it, you know, very clearly- my book, I wouldn't say it's useless, right? I mean, it's a modest contribution, right?

The real problem, okay? Which I think, you know, you try to solve, right, is structurally, you know, structurally, the supply chain of fundamental investors is broken, okay? So it got, it was broken after 2008. Alright? And so you're trying to fill a void. I am trying to help, you know, people in my firm, or in, you know, for what I can, people outside of my firm.

But it's a fundamental service, because if you do not have informed investors, you don't have price discovery, and it's really bad for society, right? So whatever helps to fill that void and to make future, you know, interested parties, good investors... any actual improvement is a good thing.

I would just close with that. So, and in a sense, you're doing this, of course, you're trying to make a buck, which is great. I am actually trying to get, well, maybe, you know, some face recognition or whatnot, or hire people for my group or for my employer but ultimately, you know, the socially useful thing is to make better investors for the future, right?

Brett Caughran

Right? I love that. I love that framing, and I hadn't really thought about it or articulated that it that way, but I love that, and I'm going to adopt that, and, and, and I couldn't agree more. So thank you. Thank you so much for that closing comment, and thanks again for the time today.

Giuseppe Paleologo

You're welcome it was my pleasure. Bye, guys,

Brett Caughran

All right, bye, Gappy.