

## EPISODE 79

### Financial Theory in Practice: Gaining Insight from Models with Marlena Lee

[INTRODUCTION]

**[0:00:05.7] Benjamin Felix:** This is the Rational Reminder Podcast, a weekly reality check on sensible investing and financial decision-making for Canadians. We are hosted by me, Benjamin Felix and Cameron Passmore. This is our first episode of 2020.

**[0:00:19.7] Cameron Passmore:** Episode 79. Can you believe it?

**[0:00:21.5] BF:** Getting close to a 100. We'll have to have a party.

**[0:00:24.0] CP:** Yeah. I think we'll plan something special on that show, see how it goes.

**[0:00:26.7] BF:** We had a listener suggest doing a live show, which would be – I don't know if we're going to do it.

**[0:00:32.5] CP:** I'm not sure how you do that.

**[0:00:33.9] BF:** Put people in a room and do what we're doing right now with people watching, I guess. Sounds like a bad time to me, but –

**[0:00:39.0] CP:** We'll see if we have some time for that. I think a 100<sup>th</sup> show is July, so you might be on that trail again. Who knows?

**[0:00:44.6] BF:** Oh, yeah. Do our 100<sup>th</sup> episode from the trail. Maybe you can come out there.

**[0:00:48.0] CP:** We're kicking off this year with a pretty good guest, I'd say.

**[0:00:51.2] BF:** Yeah. We talk about less about Dimensional funds, but we still talk a lot about the research behind those products. Today, our guest is Marlena Lee. She is right in the middle of the implementation and the ongoing research behind Dimensional's products. A big part of

her role is communicating what their research team is doing to the end-advisors and clients that are using their products.

**[0:01:14.5] CP:** Formally, she is the Head of Investment Solutions at Dimensional Fund Advisors. She's been there for 11 years.

**[0:01:14.5] BF:** She's currently the co-head of research, right?

**[0:01:22.4] CP:** Correct I. mean, Dimensional manages almost 800 billion dollars Canadian at this point.

**[0:01:28.1] BF:** Globally.

**[0:01:28.9] CP:** Correct. Pretty impressive academic background as well.

**[0:01:32.9] BF:** Of course. She did her PhD at the University of Chicago. Under Fama, she was his TA, which I believe goes to the top student of the class.

**[0:01:40.8] CP:** I believe so. I mean, just imagine being his TA.

**[0:01:43.3] BF:** I can't. We talked to her a little bit about her experience with Fama and things that she's learned from him. Even now in her capacity at Dimensional, because Fama is and has been so involved with that company, she still now works – I mean, she probably works more closely with him than anybody.

**[0:01:58.2] CP:** Exactly. I think she was also a classmate of our past guest, Wes Gray.

**[0:02:02.3] BF:** She was. Yeah. They were schooling at the same time. She's written a ton of great papers that we draw in for insight fairly often. She's as good as anybody at understanding and communicating the message that Dimensional stands behind.

**[0:02:14.0] CP:** Excellent. Anything else to add?

**[0:02:15.2] BF:** No. Let's go to the episode.

**[0:02:16.4] CP:** With that, enjoy the episode and Happy New Year.

[INTERVIEW]

**[0:02:23.3] BF:** Marlena Lee, welcome to the Rational Reminder Podcast. We're very excited to have you here.

**[0:02:27.7] Marlena Lee:** Likewise.

**[0:02:29.3] BF:** Dimensional is known for applying theoretical models and empirical research to portfolio management. How do you think about the limitations of models when you're making investment decisions?

**[0:02:40.2] ML:** It might be helpful to first describe why we even have models. We think of models as something that's useful to simplify reality. Hopefully, they're still capturing some salient features of how something works, right? They're really useful for getting insights about the world, but inherently, they're going to be incomplete.

Here's an example that I'd like to borrow from Bob Merton. Let's just consider the number pi. One model for pi is pi equals three, or pi equals 3.14. By the way, I'm not talking about apple pie. I'm talking about the number pi. Another model for pi is 3.1459.

Okay, so which is the right model? It depends on what you need it for, right? Are you helping your kids with their homework, or are you trying to compute the trajectory of a spacecraft? You need to have the right tool for the right job.

Let's go to financial markets and here's another example; consider the efficient market's hypothesis, right? That's a model that was developed by Professor Fama. He says that prices quickly reflect available information, but does this model hold exactly? Well, probably not. It's still a useful model and that most of the research says that investors are probably best served by acting as if markets are efficient. There's not a ton of evidence out there that investors can really add any value by identifying over mispriced securities.

Another insight that we gained from this model is that investors can take comfort knowing market prices are already doing a fantastic job of incorporating expectations about lots of different stuff. You don't have to pay a lot of attention to everything that's happening in the news, or in markets, because generally, they shouldn't impact your asset allocation decisions.

**[0:04:17.3] CP:** You said it's tough based on this model, to add value from finding this price securities. Dimensional's long been known as a specialist in factor investing, so I'm curious at a very basic level, how do you describe to people what a factor is?

**[0:04:34.8] ML:** I think a factor is as being one of those words that have changed in meaning over time, right? There's been a little bit of an evolution in terms of how people use that word. The original meaning and how we use it at Dimensional is it's a long short portfolio, right? Think SMB, or HML in your Fama and French three-factor model. I mean, they're designed in order to explain common variation in a factor model.

It seems like over time, folks they're using the term factor to describe a variable that explains differences in expected returns. That's definitely our goal here at Dimensional is to understand expected returns. We are sometimes using the raising drivers of expected returns. Our assessment goes way beyond just what's a driver, or what's a factor. There's lots of other questions you want to know before you can design the portfolios to efficiently pursue these different drivers of expected returns.

For example, why does it work and what's that mechanism for why it works? When does it work and for how long? Where does it work? What markets are different market segments and how does it interact with the other stuff you have in your portfolio? The way we think of it as is the level of your understanding needs to be much deeper than just what's the factor and how many you have.

**[0:05:47.3] BF:** Can you actually dig into that a little bit more? There are somewhere around 400, or maybe the number is more than that now of these so-called factors, so whatever you want to call them; quantitative characteristics that describe differences in returns. When Dimensional is looking for which factors do they actually want to use in making real portfolio decisions, what does the process look like? How do you make that decision?

**[0:06:10.0] ML:** Well, there's a lot of work that's done. We don't necessarily want to recreate the wheel. We want to see what's been done in the academic literature. Anything that we might see in an academic paper, we want to really understand better. We think of an academic paper as maybe showing you 10% of the results that were actually run. We want to understand what those other 90 are and plus a lot more in order to understand how a premium, or a source of returns really behaves.

What we tend to find is that there really aren't 400 different variables, even though that's a number that's oftentimes cited. What we find is that a lot of the factors, those 400 are just variations on a few themes. If you look at the data that's commonly used, they're going to fit into a few broad categories. You have your market prices and you have balance sheet data and those are all stock variables, meaning that you get to measure them at a point in time.

Then you have other variables that might come from the income statement and those are more flow variables, meaning that they occur over a period of time. Then for all of those different data items, you can look at [inaudible 0:07:15.9] levels, you can look at changes and then you can look at different ratios. In the end, all those different combinations because they're different themes or different variations on similar themes, they're getting to similar information about expected returns. It's not really the case that you have 400 independent variables that are describing returns, you really only have a handful.

We think that a framework is really important, so oftentimes we use evaluation framework so that again, another model to think about what are differences in returns that you expect to see in the data before you even look. What that valuation framework tells you is if you have differences in returns across stocks and you also think that prices are discounted expected future cash flows, then you're looking for low prices combined with high expected future cash flows as being indicative of higher expected returns. There's tons of robust empirical support for the predictions of that framework.

**[0:08:15.4] BF:** You could look at a factor that was developed by a machine learning algorithm, but you could look at that and say, "Well, this doesn't actually make sense." Is that what you're talking about?

**[0:08:23.8] ML:** If you were thinking about something that was derived from a machine learning framework, I think a lot of the premise behind some of those types of factors are can we turn through the data faster than the market? I think that if you're hoping to add value by always being faster than the rest of the market, that seems to be a potentially more tenuous proposition. There's not a ton of evidence that different managers can beat benchmarks in a systematic fashion repeatedly over time.

What it could help you do is through that framework, what we know to be related to returns are expected future cash flows. Are there different ways that you can measure the variables that are related to returns in a better fashion, and that's certainly something that's ongoing research. Here's an example that we have at Dimensional, where rather than just taking for example, balance sheet data or profitability data straight from a data provider where your data might get updated quarterly for example, because it's an income statement item.

If there's an event that happens where we think that those data items are stale and we can find a public source of information that we think leads to a good adjustment in that data, for example a pro forma accounting statement, those are things that we would bring into the process in order to more accurately reflect the book value of the data or the profitability of the data.

**[0:09:50.9] CP:** I've got a big, high-level question for you Marlina. If you look top-down, many investors own market cap weighted index funds and don't have any factor tilts inside their portfolios. In terms of extra return, but also reliability of those returns, how much do you think those investors are leaving on the table in terms of return and reliability of those returns?

**[0:10:14.0] ML:** Well, let me back up a second, because I do think that depending on your goal the market portfolio could be a great portfolio. It is well-diversified, it tends to be low turnover, typically low expense ratio. To your point if your goal is to outperform the market, then overweighting those areas of the market with higher expected returns, so smaller cap securities value, or companies with higher profitability is a good way to do that.

When I say good, I mean there's a lot of theoretical and empirical evidence to suggest that those are robust drivers of returns and that you're tilting the odds in your favor of outperformance by pursuing outperformance using that method.

Investors have to be able to tolerate differences from the market, because those premiums are never going to be a certainty. We can't guarantee those premiums are going to be positive over any period of time. If they were certain, then there really isn't a good reason to expect the premium. They are volatile. Being able to cope with that tracking error and periods of underperformance is part of the deal.

**[0:11:17.3] BF:** What about from the perspective of reliability? You can still get a good outcome with the market portfolio. Is it going to be as reliable as having a portfolio that's diversified across different risks?

**[0:11:27.7] ML:** It's a great question, in that we do think that if you have information about expected returns, wouldn't you want to use all of it? We think that different variables, so market capitalization, or price-to-book, or profitability, or asset growth, momentum, all of those different variables, they bring different information to you about expected returns. It doesn't matter if you're pursuing a market-wide portfolio, or a segment of the portfolio, like let's just say Canadian equities, wouldn't you want to use all of the information available to you, as opposed to just pursuing only value, or only small caps?

That certainly is true that if you have an integrated approach to using all of the available information, that does improve the reliability of outperformance. Meaning that even if you have the same level of expected outperformance, that by having an integrated approach that there will be more periods under, even holding the expected outperformance constant that you would actually outperform your market benchmark.

**[0:12:34.8] BF:** The value factor is one of the earliest. I think it was the second factor, or whatever it was called at that time, anomaly, I think as it was first identified, but HML; high minus low the value factor. Dimensional uses book-to-market to define value in portfolios, but other firms and other pieces of research have suggested that other metrics might be better, maybe using earnings-to-price, cash flow to price, sales-to-price, stuff like that can actually give you a better premium in the data. Why is it that Dimensional uses book-to-market?

**[0:13:07.4] ML:** This is certainly not the first time we've gotten this question. We've gotten this question a ton. We've looked at it a ton. We do still use price-to-book, but we use it in combination with a lot of other variables, like size, like profitability, things like momentum, SEC

lending fees even. Why though that we don't combine price-to-book with price sales, or price of cash flows at least now is that our search doesn't suggest that variables like earnings or cash flow really add to our understanding of expected returns.

In a lot of different ways of testing this, what we find is that all of the information contained in a variable like price-to-earnings or price-to-cash flows are already subsumed by size, price-to-book and profitability. It's not bringing new information. It's bringing overlapping information. I do want to recognize that there have been studies that find earnings-to-price deliver better results than price-to-book. Those studies – and over certain periods. In fact, the recent period, so let's just say the last decade. Those aren't controlling for profitability typically.

When we find portfolios that are sorted on earnings-to-price, they pick up a little bit of profitability. That makes sense, because earnings is like a profitability variable. In those periods like the last decade when you have a positive profitability premium, that dose of profitability can help. That's what those studies are picking up. It's no better than directly using profitability, which is the way we've chosen to implement.

**[0:14:36.1] BF:** No, that's really interesting. By using one of those other metrics, you're picking up value, great, but you're also picking up some of something else, like profitability.

**[0:14:45.0] ML:** Yeah. That's what we tend to find in our research. We think that we've captured that profitability, but using it in a much more direct fashion.

**[0:14:52.1] BF:** Right.

**[0:14:52.6] CP:** The concept of factors is certainly becoming widely accepted, but the explanation of what drives those factors and those high expected returns, whether it's risk, or whether it's a rational behavior, I think it's safe to say is pretty hotly debated amongst many people in the industry. You take the approach, or Dimensional takes the approach that risk is what's driving these higher expected returns. Can you talk about how you feel that's the best way to think about it?

**[0:15:17.8] ML:** I think that there's actually a lot of different reasons why stocks may have different returns. Certainly, risks are part of it, but you can have investors have different tastes

or preferences for certain stocks over others. That would be just one more reason to expect differences in returns. I actually don't think of it necessarily as risks or behavioral. I think of it as risks and behavioral, because both contribute, or potentially contribute to driving differences in expected returns.

The framework we used to think about that is once you have those differences, what's the best way to identify them? That's where that concept of prices are discounted expected future cash flows comes into play. Valuation theory is actually silent on whether those differences are due to risk or mispricing.

Let me give you an analogy. Let's just say you observe two people with different mortgage rates. Maybe they have different credit scores, or maybe the banks just had some non-risk criteria that drove the differences. Regardless of the inputs that determine that mortgage rate are going to be what's their loan amount and what are their mortgage payments? Then I can back out the lending rate, right? That's very similar to what we do.

For stocks, it doesn't tell me anything about why the expected returns, or why those mortgage rates are different, just that they are. There's certainly a lot of research that's been done in order to try and ask what are the risks, or what are the taste preferences, behavioral considerations that might drive these differences. I don't think we're ever going to see the end of that debate. It seems reasonable that on both sides, no one's arguing that different stocks should have different expected returns and therefore, these premiums should exist.

**[0:17:03.5] BF:** How do you think about persistence in that context? If we don't know and arguably can't know what's driving differences in returns, if it's behavioral, if it is we can't know, but if it is, I think there's a reasonable argument that it should go away eventually. If it's risk-based, it should persist. How do you think about that?

**[0:17:21.3] ML:** It's a real consideration of how much confidence that you put on whether a premium will continue in the future. If there's a risk-based reason, then people tend to have more comfort that that's something that won't be arbitrated away. Whereas if it's completely behavioral, then why isn't the case that it then becomes arbitrated away? That's certainly a consideration. Even in the risk camp, the different risks that people face also probably change through time or the importance that people put on them change through time.

I think what's the important thing here is that what shouldn't change through time is that there should always be differences in expected returns across securities. It seems strange that that wouldn't be the case. How much is due to risk? How much is due to mispricing? I don't think we'll ever know. Maybe it varies through time. There are always going to be those differences. There certainly should be differences in risks. We certainly see those differences come through in fixed income instruments, or fixed interests. If you think about equities as the residual claimant, then they should just be amplified.

Thinking about there certainly has to be a difference in risk component that's driving differences in expected returns. I think of if there are additional behavioral reasons, then that's just icing on the cake. In terms of implementation, you do want to be careful. Momentum is a great example of something that people don't think has great rational risk-based reasons for why it exists. That's certainly something that you look at maybe you think, "Hmm, is that something that's going to be continuing the data?"

The other piece to that of how momentum behaves is that because it's so high turnover and if you have more doubts of whether that will continue in the future, maybe you want to treat it differently, right? Because a typical momentum portfolio in the academic literature might have 200% to 300% turnover. What we see in live funds is something more on the order of 75% to over a 100% turnover.

When you have all of that turnover and maybe not great reasons, great being risk-based reasons for why it exists, is there a way that you can pursue them that has lower opportunity costs associated with them, so that if the premium does either get reduced in the future, or even go away completely that you're still ending up with a great portfolio? We use it in a different way. We don't implement it the exact same way as the academic literature would implement it in those studies. There are ways you can still use this information in a variable-like momentum and have it be a low-cost approach.

**[0:20:08.1] BF:** Yeah, it's interesting. I guess that speaks to the question that we asked at the very beginning, which was the limitations of models. You can't just take what momentum looks like in the data and put that into a portfolio.

**[0:20:17.9] ML:** Yeah. You do want to give them some thought. That's where I was trying to get with what's a – go beyond what's a factor. You do want to understand how it behaves, so that you're not just pursuing every single thing the same way. How you pursue value might be different from how you pursue momentum, because they behave differently in the data. There are different theories for why they exist in the data and that I influence your confidence in how these premiums will behave in the future.

**[0:20:46.5] BF:** We were just talking about persistence and what is driving factor premiums, whether it's risk or behavioral. The value factor has had a good decade or more now in the US of a negative premium. Value stocks of trail grow stocks pretty substantially. We just talked about how we don't really know what's driving any risk premium, or if it is a risk premium, is it riskier behavior. Thinking about value underperforming and not really knowing what's driving any potential future positive premium, what would it take for us to stop believing that value is going to deliver a positive premium in the future?

**[0:21:23.2] ML:** When I think about the theoretical rationale for why we expect the value premium to be positive, I think that rationale is evergreen and it really supports the expectation that the value premium should be positive every day. That rationale is just if you pay a lower price, that should indicate higher expected returns. That seems hard to argue that it is specific to what decade, or even what century the investor is investing in. We do know that these premiums are quite noisy, they are just as volatile for example, as the equity premium is also quite volatile.

There's a recent paper by Fama and French called Volatility Lessons. In it, they assume, let's just say you had the historical distribution. That means you knew that the value premium was going to be in their paper was 29 basis points a month, so roughly 3.50% annually. Even in that case where you knew that the value premium was positive and 3.50%, there was still more than a 5% chance that value would underperform the market over a 10-year period. Even though we expect these value premiums to be positive every day, the range of outcomes suggests that a 10-year period of underperformance isn't actually that unusual.

That's something that is I think really important for investors who want to pursue these premiums to just understand how much noise there is in them, because you really can't interpret too much when you do go through these periods of underperformance.

**[0:23:03.3] BF:** It's noisy, but the market could do the same thing. I think that's one of the things people often miss is that values underperform for 10 years, but there have been decades where the equity risk premium has been negative as well.

**[0:23:13.9] ML:** Absolutely. In the US, there was a 17-year period where US equities underperformed T-bills. People have the most confidence in the equity premium. Going through that period, you have to have a framework for how can you stay invested even when you go through those periods because they can and have happened in the past. Certainly not pleasant to go through though.

**[0:23:35.4] BF:** Definitely not. That's why combining the different, like if you have market which can underperform for a decade and you also have value which could underperform for a decade as it has, they're not necessarily and maybe even probably aren't going to underperform at the same time, or deliver a negative premium?

**[0:23:50.2] ML:** Right. That's what we've seen is actually people generally if they're in a well-diversified global portfolio, I've seen pretty good positive returns over this last decade, it's just they haven't really kept up with in particular, it's been the S&P 500 that's just done really well.

**[0:24:08.6] BF:** It comes back to the whole concept of the limitation of models. One of the questions that we get sometimes is why don't you guys just go all small cap value?

**[0:24:16.5] ML:** I think this last decade tells a lot of people why. It might be the portfolio with the highest expected return, but darn, there's a lot of noise in it. Are you going to be able to stick with it when you go through one of these periods? Sometimes we get the question of what's the right asset allocation? It's going to be the asset allocation that a person can stick with. If an asset allocation is not one that an investor can stick with and stay invested during a period of disappointing performance, then it wasn't the right asset allocation.

**[0:24:47.8] BF:** You mentioned having the valuation framework to think about differences and expected returns. We've talked in a fair amount of detail on the podcast in the past about the valuation equation. It doesn't contain anything about size, like small cap stocks don't show up in

the theoretical valuation equation, at least assuming that we're talking about the same one, which I think we are.

**[0:25:07.7] ML:** Other papers have shown that on its own small size, small cap stocks don't actually have their own premium. It's not in the valuation equation it doesn't necessarily show up in the data. How do you think about the role of company size and identifying differences and expected returns?

**[0:25:23.3] ML:** Well, just like what we were saying earlier. We know that a model is incomplete and that applies to the valuation model as well. We know not everything we include in our process fits neatly into evaluation framework. It is a model. It's going to be incomplete. Size is tied to price and right? It's price times shares outstanding. We believe price is tied to expected returns. There is a tie, but to your point, I understand it's not a direct tie exactly to the valuation equation.

Empirically, most asset pricing models do find that including size is generally additive in understanding returns. You see that in different factor models and different cross-sectional regressions that it does matter in the data. Then also in terms of live performance, Dimensional has had success at delivering the size premium. That's most easily observed in funds that only invest in small caps, such as the ones that we have in the US. Our US domiciled small cap funds have outperformed large cap indices since inception and that's net a fee. I'll point out that you also get that small cap exposure in the Canadian funds, but it's just part of an allocation across the entire market. That also includes a focus on value and high profitability.

**[0:26:40.7] CP:** Speaking about performance Marlana, dividend growth stocks, for example like the ones in the S&P dividend aristocrats index have tended to outperform the market and this is one of the hottest topics certainly on Ben's YouTube channel for debate. The obvious question is why wouldn't we all build portfolios based on dividend growth stocks alone?

**[0:27:00.9] ML:** Well first, it's important to understand why that index has performed. That portfolio behaves like a portfolio of high profitability value stocks. You can see that through a factor model. What do we know about stocks that have high profitability and low relative price? We know those are the types of stocks that have been associated with higher average returns.

Once you control for those exposures, you've also explained the returns of that type of portfolio. We can see that by there are five factor alpha loadings, for example, are close to zero.

That means that it's possible to tilt to size value and profitability, so that you're getting a very similar expected return profile as a portfolio of dividend-paying stocks. We understand that clients might have a preference for how their return is delivered, so what's the split between dividend income and capital gains? We think that that's a fine preference, but it's really important to understand that that preference comes with trade-offs, specifically a potential loss of diversification.

For example, the S&P 500 dividend aristocrats index had just over 50 constituents as of July of this year. It's not the most diversified portfolio out there. It's just a matter of trade-offs. We think that having a well-diversified portfolio that's focused on the drivers of expected returns, there you're still going to get a total expected return profile that will be similar. It may not have the same focus on the return through yield and more of it would come through capital gains. We think that that's split. It's a matter of preference, but we think that in terms of how much net income or how much wealth you have at the end of the day, it's going to be driven by the total return.

**[0:28:47.6] CP:** Do you have an opinion as to why people almost don't want to hear this rational evidence? We've given this explanation countless times in our various channels and we still get a fair amount of pushback on this. In the end, if owning a portfolio of dividend-paying stocks helps you behave better, is it even worth it to continue to debate that someone will perform better based on that belief system?

**[0:29:09.7] ML:** I mean, if I'm going to speculate, I think that it's a device used in order to put some discipline on the spending approach, right? I don't want to touch principle and I'm just going to pursue, or I'm just going to spend from dividend or yield income. There are different ways to address that, right? If you're working closely with an advisor, then the advisor can help bring some discipline or awareness around what's a sustainable spending rate, or spending policy.

I think that there are other ways aside from just only allowing yourself to spend from dividend income in a portfolio. Another consideration or trade-off that people just need to be aware of is if

it's the case that the preference for spending out of dividends drives one to a riskier portfolio, one that might not be appropriate for their risk tolerance and for their financial goals, then that seems to be a potentially suboptimal outcome from that preference.

I do think of it as a matter of trade-offs. It's a preference that we hear from a lot of clients. I do think it comes from this idea of not wanting to touch principle. On the other hand if it's leading to other investment outcomes, for example too much risk in the portfolio, or inadequate levels of diversification, it seems better to try and embed spending discipline in another way.

**[0:30:37.3] BF:** I've always thought it's funny to let corporate dividend policy dictate your retirement spending policy.

**[0:30:43.8] ML:** Yeah, especially when you see fewer firms are paying dividends these days. There's other ways that they have to pay back money to investors, so share repurchases are becoming a much bigger way for returning capital to investors.

**[0:30:56.8] BF:** We've talked about factors and we've talked about the valuation equation, valuation theory. Dimensional is very much aligned with the Fama French thinking and they've got the Fama French five-factor model and we've talked about a lot of the factors in that model. AQR has a factor model. MSCI has a factor model. There are probably many, many others. Those are just the ones that came to mind. Once someone's decided to go down this path of factor investing and decided that there are a differences in expected returns between securities, how do you choose which factor model that you should use to evaluate your investment decisions?

**[0:31:29.0] ML:** Here's what are similar across all models; we know they're all incomplete, they all require estimates, those estimates come with noise. How we were saying earlier that you need to have the right model for the right job, it depends on what you're using that factor model to do. A common use would be to use a factor model to gain some perspective about how a portfolio is positioned, right? That's a pretty common use of the factor model.

If you're using it for that, then you just have to be aware that there's a lot of noise in these estimates. Don't read too much into the output of any one model. Looking at something in a variety of ways can sometimes be helpful.

At Dimensional, we call that surrounding the problem. We might look at a Fama and French three-factor model, a Fama French three-factor plus momentum model, Fama and French five-factor, five plus momentum. We'll look at a lot of different ways, but then we'll also look at characteristics. We'll look at how the holdings are allocated. That does take a lot more data and analysis in order to do that. All of those different methods give you different views of the portfolio, so you can get a more complete picture. I would just advocate that there's no one model is going to be perfect.

**[0:32:46.9] BF:** Do you think there's any merit to – and I don't know if there is, but if you look at one factor, like say the Fama French five-factor model and you look at another model like whatever, the AQR factors, are there going to be differences in characteristics, like the amount of turnover that you're going to get based on the way you're defining factors? Is a simpler factor definition going to give you an easier to implement portfolio?

**[0:33:07.2] ML:** Well, that's a different question, because you'll notice that the purpose that I had for my previous example is to understand what's in a portfolio, how it's tilted. If you're after investment implications, there I think it's really important to go well beyond just thinking about a factor model. We would cut the portfolio in a lot of different ways to use. We do use time series factor models, we'll use cross-sectional regressions. We'll use a lot of portfolio sorts and look at how in those portfolio sorts how a premium shows up across different segments of the market, how it interacts with other premiums, certainly how much it turns over is a super important consideration.

If you have something like size value or profitability, those variables tell you something about expected returns for years and years and years. Whereas a variable like momentum, momentum is telling you about returns for the next six to 12 months; tends to decay completely somewhere around the nine-month mark. The turnover that is associated with a particular variable, where it shows up, so with asset growth for example, we see companies with really high asset growth as having very poor performance among small cap. It's really among those with extreme high asset growth where we see it. They all behave a little bit differently and all of those questions are important considerations for deciding the investment implications, which in my mind extend far beyond a factor model.

**[0:34:46.3] CP:** I have the fixed income question for you, Marlana. Let's assume I'm a young investor, say 25 or 30-years-old, have a stable job, stable income and I'm investing for the long-term. If you assume I can handle volatility, so take out the behavioral considerations, what are some of the good arguments that I should own bonds in my portfolio?

**[0:35:08.7] ML:** If you're a young investor, yeah, this gets to that point around what's the perfect asset allocation. For a typical young person and let's just say we're talking about saving for retirement, right? Because if it's a near-term goal, then maybe fixed bonds make sense. If it's saving for retirement and retirement is decades away, then a lot of the both rules of thumb, but even Bob Merton whose done a lot of work in life cycle finance would say, "Hey, this person can tolerate a lot of additional risk in their financial portfolio."

The reason for that is that a lot of that retirement is going to be funded, not from that financial portfolio, but from their human capital. It's actually their future savings that would fund the bulk of their retirement if you're talking about someone who's young and to the extent that their human capital is less risky than equities, you can think of that as serving as the safe part in their overall portfolio. Therefore, they can take on a lot of equity risk.

I think that that's generally what we see is that the younger an investor is, the more allocation they have to equities. Again, if you have a specific investor who says, "Hey, I really can't tolerate the volatility of equities." During an equity market downturn, they're not going to stick with their asset allocation, then it's not going to be the right asset allocation for them. Maybe that person because of their risk tolerance needs a greater allocation to bonds in their portfolio.

Then it's a question of making sure that they're aware of the trade-offs. That portfolio will have lower expected returns, because we expect a positive equity premium. What does that imply? Either they're going to need to save more, or at least an expectation, have less accumulated for retirement. Those are the trade-offs. I think that that's just really important to make sure that we're always highlighting the trade-offs associated with any financial decision.

**[0:37:12.0] BF:** I think you might have just answered the question that I want to ask, but how far can we push that logic? A 100% equity makes sense for someone who's young and has a stable income. What about leverage?

**[0:37:20.6] ML:** That's something that you'll certainly hear is that actually, someone who's young maybe they should have a leverage equity portfolio. We tend not to see it too often. I'm not sure why that's the case of whether it's the cost of leverage, or whether the appetite for having that level of volatility equity risk, but also then those higher expected returns are worth it for most investors.

**[0:37:49.2] BF:** Risk factors in equities are talked about a lot and we've talked about all different angles of that already. When it comes to fixed income, I don't think that anybody really talks about factors. Can you apply the same thinking to investing in bonds as you can with stocks?

**[0:38:05.8] ML:** Yes, a similar concept for sure, but the details of how you implement a systematic approach in fixed income should be different. Well, because bonds are different than stocks. Here's what's similar is different bonds we think should have different expected returns. We also still think that prices are discounted expected future cash flows. It's just that for fixed income, that discount rate is readily observable and it's called a yield. For a bond with no risk of default, the yield is the expected return if you hold that bond to maturity.

Then if you don't hold it to maturity, you can actually calculate the expected returns based on the yield and the steepness of that yield. Those two things combined are called a forward rate. They're readily observable every single day and you can use them to target the highest expected return bonds within a universe. That's the systematic approach to fixed income that we've applied for over 35 years.

There's other variables, or other studies that we've seen to try and explain differences in fixed income returns. The important part though is you have to control for the things that you already see in the data. In particular, you get to see yields. One thing that you have to be careful of is not to use a noisy proxy when you actually have the variable that's readily observable, right? The analogy I use there is if you want to know the time, look at your watch, don't look at a sundial.

**[0:39:33.4] CP:** I have a separate question for you about different asset classes. We all know about stocks and bonds and diversified portfolios and factor tilting. We've talked about that a lot. A question we're getting more and more is at what point does it make sense to consider adding in other asset classes, like liquid alternatives, or hedge funds, or private equity?

**[0:39:51.6] ML:** Yeah. Here's my framework, we're big on frameworks, for thinking about whether an alternative investment makes sense. Here's the first question is does it expand my investment universe? I think that that's a really important question if you're asking about diversification potential. In the case of liquid alts, the answer is typically no. A lot of liquid, all strategies they might go long and short different securities that are already held in a global portfolio of listed stocks and bonds. Then when you add them up to your global stock and bond portfolio, what you get is net exposures that might result in either underweight certain securities, or overweight other securities.

At Dimensional, we are doing something very similar in our portfolios, where underweighting securities with lower expected returns, overweighting those with high expected returns. We think that there's really good reasons why you might potentially want to do that. Then because it doesn't expand the universe, we don't think of the motivation for that is whether it increases diversification.

You want to then understand well, do I think that we're over and underweighting because we're pursuing a driver of expected returns? Then all of the other things that we just talked about about how robust is that driver, how confident am I that it will continue in the future, those are the things that need to be assessed. The diversification argument is just a red herring.

Sometimes you might have the answer to that first question. Does it expand my investment universe? The answer might be yes. For example, private equity I do think as an expansion of the investment universe relative to a public markets only portfolio. Maybe there's something to the diversification argument there. Then the other questions that investors should ask are what are the fees? How much idiosyncratic risk am I taking? Then also, just do I expect it to be additive to the return profile of my portfolio? Is it worth a place in my portfolio?

The idiosyncratic risk question in particular is really important, especially when considering private equity, because the range of outcomes across private equity managers is huge. There is one academic study that reported a cross-sectional standard deviation of over 40%. Let's assume that there are good private equity managers. An investor should also ask, do they think they can identify them in advance, right? Would they take my money, or would they have enough capital raised from big institutional investors?

The economic principles that predict – well, you wouldn't necessarily expect that even if you found a great manager that you should get higher expected returns, because economic theory would suggest that if it's the manager with the skill that's the scarce resource, then they should be the ones who reap the benefits of their skill through higher fees.

It's hard to get good data for private equity performance and that's because the data – all of those databases tend to be self-reported. Because of that, there's oftentimes biases in the data. The academic literature is actually pretty mixed, depends on the data source you used and how they accounted for different biases, how they benchmark the funds.

I will point out one study that provides some anecdotal evidence, and that's the NACUBO TS Study of Endowments. Their 2018 study included over 800 US endowments and that represented over 600 billion USD and AUM. If you just take that aggregate portfolio of all of those endowments, half of it was invested in alternatives. That includes private equity, hedge funds, private real estate, natural resources, all of your typical alternative categories. Over the 10-year period ending June 2018, the average endowment underperformed the Dimensional Global 60/40 index. The average endowment earned an annualized return of 5.8% versus 6.8% for the Global 60/40 and that's with a higher standard deviation. Again, just anecdotal evidence, but it doesn't really support the notion that investors are better off with the addition of alternatives.

**[0:44:15.2] BF:** People in Canada and probably in the US too, have been pretty worried about an economic recession, I think mostly about a US economic recession. I think a lot of that concern has been driven by the US yield curve inverting. Is there any evidence that investors can use yield curve inversions to time either the market or factor premiums?

**[0:44:38.7] ML:** No. We've done some work with the internal research team at Dimensional. Professors Fama and French have written a piece now where they look to see, "Hey, can you use something like a yield curve inversion in order to make either market or factor timing decisions?" The evidence doesn't suggest that you should. There's really no evidence that you can have a better investment outcome by doing that.

Even from a theoretical perspective, it doesn't really make much sense, right? How could the expected equity premium ever be negative? Who would invest in stocks if that were the case? Beyond yield curve inversions, there's been a ton of empirical work. We for example, have looked at a whole host of different market timing signals from ones based on mean reversion, aggregate price ratio, so that includes things like Shiller's CAPE Ratio, macroeconomic variables, that includes yield curve inversions, but also things like interest rates. What we've consistently found is that the best approach is a disciplined one.

Remember, in order to time market successfully, you have to make two right decisions. Even if your odds are 70% chance of getting it right, which I would say is pretty darn high, what are the odds of doing that twice? That's 49%. That's just a little numerical way to show why it's so hard to tie markets.

**[0:46:02.8] BF:** I really like that example. I haven't heard it framed that way before. Even if you have a positive expected outcome on one side and on the other side your overall expected outcome is negative.

**[0:46:12.7] ML:** Yeah, it's hard to do it, right? Two times in a row.

**[0:46:16.2] CP:** You're having an incredible career in research in this industry obviously. I'm just curious, what has been for you the most interesting research finding since you've been at Dimensional? Do you have a favorite? It's like a favorite child.

**[0:46:30.9] ML:** Yeah, exactly. I was going to say it's like your favorite child. You're supposed to love them all, right? Yeah, I think that that will actually be my answer is I have been surprised many times with the research process at Dimensional. I wouldn't say it's a finding, it's the process. I did my PhD at Chicago Booth. The finance seminars at Chicago Booth are known for having really lively debates. I think a lot of that stems from a healthy skepticism about just patterns in the data.

When I decided to go into industry instead of doing academics, I don't know, I guess I assumed that I'd be leaving a lot of that behind. That's certainly what people tell you, or lead you to think. What I've found is that it's not at all true, especially at Dimensional, or I guess I can only really speak for Dimensional, because that's where I went straight out of my PhD program. Here, it's

where I really learned to appreciate that there's a lot of noise in empirical asset pricing research. The way you have to deal with that is you look at the data a lot of different ways in order to try and surround that problem.

I think our approach is unique. When you look out at the landscape, I don't think there's anyone who really implements the research in the same way that we do, right? We all have access to the same data, the same academic studies. The difference is really in the interpretation and the implementation of those ideas. That's where I think that Dimensional really does interpret and implement differently.

**[0:48:09.1] BF:** You spent more time with Eugene Fama than most people will ever get to in their lives. What's the most interesting thing that you've learned from working with Gene?

**[0:48:18.6] ML:** There's a lot of different things. Here's one that I'll point to you and this is something I learned really early on in my experiences with Gene. As a first-year PhD student in his class and then later as his TA, there is a lot of thought that goes into his language. Precision and language, I think can really only result from precision in thinking. I remember grading exams, where there would be a whole essay in order to circle around an answer that should really just take 10 words. We would dock a lot of points for that, because it showed a lack of clear thinking. That's something that I certainly noticed as a student and really started to appreciate once I got to Dimensional, where we're also really big on precision and accuracy of language. That I think comes from all of these decades of working with Ken and Gene.

I also think of it as a reflection of our approach, right? We want to deeply understand how things work. You're never going to be able to prove things with data. Making sure that we're not making statements that we know aren't the case, or are stretching what the data can say with how we're describing it in our words is something that we are really careful about. It shows in our communication with clients as well.

We want people to understand here's the whole range of outcomes that you might expect, because we think that it's really important to understand here's what your experience might look like. That setting those expectations are important, in order to have a good investment experience, so that people can stay disciplined, because you can't control the markets, but you can control how you react to them.

**[0:50:07.0] CP:** How do you define success in your own life?

**[0:50:10.4] ML:** This is going to sound corny. I think of success as a mindset, instead of a destination, right? Some people might say, "I'm going to be successful when I do X, Y and Z." Success for me is having an appreciation for where I've been, appreciation for where I am today and being optimistic about the future, because we should always be striving to be better in the future. Using that definition today, I feel really successful.

I'm incredibly fortunate for all of the experiences and opportunities that I've had. There has been so many people in my life who have helped me along the way. I have two wonderful boys, they are crazy, they keep me busy. My super dad husband who lets me have the career I have. My job is never boring. There is always new challenges. In the end, all of the work that we're doing at Dimensional is to help lots of people put their kids through college and have a secure retirement. I think that the work we're doing is also really important from that perspective. That makes it really rewarding and really cool.

I know that I'm not perfect, so there's a lot of things that I have to work towards in the future and certainly, have all of the people around me helping support me in pointing out those flaws every day. Yeah, using that definition of success, where I am today, I feel pretty darn successful.

**[0:51:31.8] BF:** Marlena, this has been great. We really appreciate you coming on the podcast. Again, thank you.

**[0:51:36.7] ML:** Thanks for having me.

**[0:51:38.1] CP:** Yeah, it's been a real privilege to introduce you to our listeners and thanks very much, Marlena. Thanks everybody out there for listening.

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