THE DERIVATIVE BY RCM ALTERNATIVES

Sequencing, Skew, and (Option) Strikes with Hari Krishnan Krishnan

Jeff Malec: Hello, everybody, I'm excited to have with us today the author of the Second Leg Down, which I was sad to learn isn't about an athlete who loses his legs and goes on to compete in the Olympics, but instead everyone's favorite dinnertime topic options. We have **Hari Krishnan** Krishnan with us today, who is exactly the person I would want at the front of the lecture hall if I was taking a course on option pricing and volatility dynamics during market crashes with that great sounding voice and soothing cadence when explaining very complex topics. So welcome, **Hari Krishnan**.

Hari Krishnan: Thank you very much.

Jeff Malec: What do you think of my course title option pricing and volatility dynamics during market crashes?

Hari Krishnan: Well, that's a mouthful. It delivers on that, but yeah.

Jeff Malec: Should we pitch that to a college to offer some students virtually?

Hari Krishnan: Yes, but I'm going to recommend that you teach that course. Now, I've had my fill of university life.

Jeff Malec: I was going to ask, have you ever been in front of the classroom?

Hari Krishnan: I have and it's a challenge because some people are trying too hard to impress, and the others are falling asleep. So, it's a bit of an it's a tough crowd, among the students.

Jeff Malec: So where was that? Where did you teach?

Hari Krishnan: I taught for one semester as an adjunct at the University of Chicago. I've done the odd lecture here and there. And that's about it.

Jeff Malec: Okay, so it's never a profession. What about that “those who can't do teach those, those who can't teach do is that work” or no?

Hari Krishnan: I love it. Yeah.

Jeff Malec: So where are you joining us from? You're usually in New York, but you're in a little COVID retreat.

Hari Krishnan: I am in a beach shack for lack of a better word in Duxbury, Massachusetts.

Jeff Malec: Okay, is that the cape or no?

Hari Krishnan: Sort of smack dab in between Boston and the cape.

Jeff Malec: Alright, nice. It's about to start getting nasty with some nor’easter’s coming in there.

Hari Krishnan: Oh, that's always the fear. And I haven't we haven't had our generator service. So, I think I need to do some hedging now.

Jeff Malec: Exactly. And outside of writing books and running hedge products for investors. You're also a hobby jogging marathon traveler. What does that mean exactly?

Hari Krishnan: Well, I used to trade, SocGen used to be our main prime broker. When I was in London and I had a friend, he was into marathons and he was also into finding the best hotels that were close to the finish of the marathon. Sort of hang out, drink some beer and eat well. And the food and drink never tasted as good as at the end of a marathon. Maybe that's too much punishment to take on the way but we did several European marathons, no earth shattering times. You know. I think I was running in the mid to high 3:20s but it was a great time going out there and getting nervous for the race and then really enjoying our food at the end

Jeff Malec: Wow mid-3:20. That's good. I take it.

Hari Krishnan: It's okay.

Jeff Malec: And they were only European. Have you done them back in the States?

Hari Krishnan: I haven't done anything. I haven't run anything marathons in the US now.

Jeff Malec: You're retired now?

Hari Krishnan: Yeah.

Jeff Malec: So, give us a little background on how you got into this crazy world of options; you mentioned London and SocGen. So, give us a little personal background.

Hari Krishnan: Yeah, well, I've been around the block. And so I have a PhD in chaos theory, which we could talk about over a beer or something. Then I started working in the option space, basically, I worked for a market making firm that wanted to establish an off floor presence. And so basically, what we did was we developed models that allow them to lay off the risk in individual option positions, using index options, so they wouldn't have to unwind intraday. And so, it was basically looking at the correlation between implied vol, by volatility, individual stocks versus indices as a thorny topic.

Jeff Malec: But because they have a bunch of Microsoft to hedge and you would tell them like, okay, we need to do X index puts in order to do that, or buy the X number of index futures in order to hedge that?

Hari Krishnan: Exactly. Yeah, I mean, typically, we did options versus options. And so, I might be different from some of your guests, especially guests who have a lot of sell side experience. Um, we think a lot about Delta one hedging, you know, hedging using futures or the underlying, I never really focused on that. But you know, that's a, that's a thorny topic as well.

Jeff Malec: Well that's what everyone wants to talk about that right now, with the gamma is driving prices higher driving prices lower. I've been trying to get on some current market maker dealer that and see like, is that what's happening or not? It seems a little too simplistic of an explanation to me.

Hari Krishnan: Well, it is, it is actually. The nice thing about it, though, is that, you know, as I've been in this space long, over time, as I've been in the markets, for a long period of time, I realized how important position is. And, you know, the two forms of risk that I've always looked out for credit, and positioning, I kind of learned that when I was doing global macro in London, just kind of another add on to my bio. But, you know, if I had to go back and look at 2008, versus today, 2008, was a credit from 2020, aside from the huge exhaustion of shock, which I'm sure you can get other experts to talk about, has been a real issue of positioning. And so, some of the stuff, you know, the squeeze metrics stuff, or the overload of single name calls, that dealers may have been short based on client demand, which forced them to hedge. That's been one issue. Clearly, that's been an issue. Has it been the only issue? Probably not. It's very complex.

Jeff Malec: And do you do you feel there's an unlimited supply of dealer supply on those options? It seems that is a missing piece to have just like, yeah, the dealers will just sell retail as many options as they desire.

Hari Krishnan: I sell a lot out of price. I mean, there will be an adjustment in the skew as a function of that. And then the skew adjustment isn't just because say, Tesla has had some big returns historically, it's also because the flow is so heavy on let's say, on Tesla, or some other name, that dealers have to jack up the implied vol numbers to be close to at least collected a fat risk premium for taking on the risk. So, to a degree, yes, I mean, you can create as many contracts as he wants. But, there are natural limits to how much supplies really, really them.

Jeff Malec: Right. Got it. So sorry, I derailed your bio there. So, you're, you're in line in your market making option desk.

Hari Krishnan: Well, then I did global macro for eight years, I ran an FX strategy. I ran hedging overlays. And I also ran a diversified absolute return strategy. So, I did that for about nine years. And had the classic issue that many of us face where we have a very large, sticky investor who turns out not to be all that sticky. Yeah, seven or eight years and so at some point, I moved back with my family to the US. Probably for a lifestyle change and got back into an options-focused way of doing it. So, the way I'm trying to hit people nowadays is to say, well, look, I'm someone who can help in terms of interpreting the map macro perspective in certain very specific ways. I don't cover everything. I'm not a pundit, not a media personality, per se, but also someone who knows the intricacies of trading options from the buy side. So that's kind of where I'm trying to hit people.

Jeff Malec: I don't think you should be hitting people at all. But I get what you’re saying.

Hari Krishnan: Strike them hard, you know.

Jeff Malec: All right. And so, there's news, right, you just recently joined a new firm?

Hari Krishnan: Yes, I mean, I've known the folks in SCT for a long time. Um, and given that my existing firm that Bob decided to basically move on and do something else. I've taken over his business and then plugged it into the infrastructure of a more well established operationally sound hedge fund. So, I continue to run an independent business line. But within a larger hedge fund, and you know, I hate to use too much corporate speak, but there's some good synergies there.

Jeff Malec: Some good synergies good

Hari Krishnan: Yeah, some fine synergies where they're experts in machine learning, they've been doing it for over 20 years. And they are aware of the strengths and weaknesses of ML. And they have a, an honest approach, where they say that real danger in machine learning is that the algorithms get too greedy. And they start latching on to what's been going on recently. And they're vulnerable to a sharp shift in sentiment. You know, like a jump in the regime. And that's exactly what I tried to do with some of the hedging strategies to account for that.

Jeff Malec: I just saw today, some Zero Hedge post, they had a screenshot of JP Morgan's algo on the vol space of like dollar vol's cheap, and this is expensive and buy this sell this. It made me cringe for a second of like, this, this is a little worrisome, but then I was like, that's fine, get more and more into that space, because I think the humans might have an edge there.

Hari Krishnan: Yeah. Yeah. I mean, he's pretty good at saying, I don't know what's happened, but something has changed. Machines are less good. I mean, the old speech that I used to hear that I think it's pretty valid is machines might be more emotionless, but that has the negative attributes too. A machine doesn't worry about trading a million loss instead of 100. Yeah, sweating if they, you know, they trade the wrong size, or they feel the pain of a position going against. And in a way, that's a good response.

Jeff Malec: They won't know if they get turned off. They don't know they can get fired.

Hari Krishnan: Yeah, exactly. Exactly.

Jeff Malec: Uh, so in SCT's, they're in New York.

Hari Krishnan: Yeah, they're on. They're in Greenwich Village.

Jeff Malec: I wonder, I'm curious to see how this all shakes out. And whether these hedge funds in New York all bail on the expensive real estate and have everyone remote and see what that looks like. But we'll see. Yeah,

Hari Krishnan: That's a great question. You know, it's really a question of also, how important culture is this culture breeds more success at the trading desk? I really don't know. Back in the day, people were assuming that was the case. In the same way people assumed the variations in volume on the trading floor was an important signal of liquidity, things like that. That's all changed. It remains to be seen how this will, this will evolve.

Jeff Malec: Yeah, I was speaking with a I'm going to forget where he works. But it's one of the big mutual fund or asset managers in Chicago. He was a buddy and he was saying that that's what they're most worried about the culture. How do you bring in the new people get them plugged into the culture that they built up? Like, we'll see…over zoom.

Hari Krishnan: Our resume? Wow.

Jeff Malec: Doesn't work doesn't work as well.

Hari Krishnan: Zoom happy hours. That does not work.

Jeff Malec: I know that was a big thing right in the beginning, right. I don't think I've done one since the beginning. But they were like two, three a week in the beginning. So, I was about to say I must ask on the name. And that being a child of the 70s of the **Hari Krishnan** Krishna…cult would you call it?

Religious movement. I don't know if it's a cult. But any relation there what's going on there. Just coincidence?

Hari Krishnan: Okay, that's a good question. Well, first, I'll say I have nothing to do with the movement or cults or whatever.

Jeff Malec: Cults probably too strong, let's just call them a movement.

Hari Krishnan: Well, you know, I mean, it's a matter of perspective, I've never been involved in it. I don't know much about it. Um, I'm speaking a little off piece, but I've never been one in favor of conversion into any religion. And um really the origin of my name is there are not that many traditional South Indian names for people of my caste, there are probably five or 10 with various variations, and then the names of gods, you know, traditional Indian gods. And Krishna is one of those gods, one of the, one of the important ones and so my first name and my last name are very traditional names. It's a bit like what people in India say, no one ever has the name Wolf or Clint, or Cliff, and all the names have religious meanings, whether you like it or not, and it's just tradition. And that's about it, really. And you know, it's funny, because as I was telling you before the call, I was born around the time of Woodstock, and my parents weren’t really hippies. They were blissfully unaware of the, you know, the ridicule, but the difficulty it would cause me in my early years, but you know, I saw no need to change it. It's sticks in people's minds. And should finance go south on me, I've told other people, I can always shave my head and use my soothing voice hopefully. And, you know, make podcasts about inner peace and serenity. Done.

Jeff Malec: I'd listen to at least one. Well, sorry if that was insensitive, but I was curious, I needed to know.

Jeff Malec: So, let's get into your strategy a bit. A lot of us in the investing world are worried quite simply about protecting our portfolios from a market crisis. I'll use air quotes there. But it seems you don't really see a market crisis as a singularity. You kind of see it as having different stages and profiles.

Hari Krishnan: I do.

Jeff Malec: So yeah, tell us what you see as these stages and how your strategy deals with those different looks, so to speak.

Hari Krishnan: Okay. Well, you know, there is an economic cycle that people talk about, there's a credit cycle. And you know, as people are increasingly become aware of the volatility cycle as well. And the vol cycle, you can start it at the, in the late stages of a bull market, where investors are complacent. And when investors are complacent, the prices of options are low, premia are small. And the reason they're small is because people don't really feel they need to buy insurance over any horizon. So short dated options are relatively cheap, long dated options are cheap. And the skew isn't that steep in terms of points, it might be in percentage terms, because at the money vol is so low, but it's not particularly steep in absolute terms. Now, as things get worse, if there's a crack in the market, it's a little flash crash. And I'll just use equities for now, equity indices, because it's common fodder for most people. The first thing that happens is the short end of the vol surface picks up. So, investors are now saying, oh, there is some risk in the short term, but we're not going to adjust our risk estimates for long term.

Jeff Malec: And short end you mean short term?

Hari Krishnan: Yeah, you know, options when it wants to go something like that we're furthering. But if conditions continue to get bad, and we sort of stopped looking like we're going into a bear market, then the entire term structure picks up. And options become more expensive across maturities. And so there the market is saying, effectively, we want to price heightened risk on over longer devices. And so, you basically get stages in the process. Now, if the market does quiet down, and there's a reversal and realized vol comes down, then the short data starts dropping again, the long end remains elevated until finally the cycle repeats. And they have stages in where risk is repriced. And the way I thought about it in the book that I wrote and various speeches that I blab on about this is that if that is the case, if that volatility cycle is fairly sequentially predictable, might not be able to predict what happens but you can predict the order, the right strategy for hedging should involve rotating from one type of hedge to another as the surface changes. So, if all options are cheap, go out and buy some long dated ones. And sit and wait, I guess, again, where you collect some. You get some investors to come in and you say, bear with me, I'm going to buy two-year options, three-year options, whatever.

Jeff Malec: Universa model, would you say?

Hari Krishnan: Yeah, Universa probably does some of that. Six South specializes in that.

Hari Krishnan: And it's basically a game where they're saying, volatility is cheap from a valuation perspective. So why not buy it in a setup where your Vega divided by theta ratio is high. In other words, every day that goes by, you don't lose much in time decay. But for every point, that risk is repriced up, you get a big bang for the buck. And then people will say, Well, okay, that's, that's nice. But how do you take profits? You can get in nice and quiet, but how do you take profits? My view, over time evolved to one where I basically argued that you don't want to be taking profits where you say, your clients one day you're hedged, and the next day, you're not hedged? Yeah, I must roll with this unless the client wants to do that.

Jeff Malec: And a little better way to put that my view, or from my brain, at least would be how do you monetize it? Right? Like taking profit seems like you have a profit motive. But if this is a hedge, you'd have a kind of a different motive of it's supposed to be covering some piece of another piece of the portfolio that I need to monetize the insurance. Right? You don't your insurance, you mentioned you're generating your hurricane insurance, you don't have to decide when to monetize it, right. You get paid out if there's a problem. If not, you don't.

Hari Krishnan: Correct, whereas these things can lose value quickly, too.

Jeff Malec: Very quickly, right.

Hari Krishnan: Yeah. And yeah, monetization is the right word. And so basically, the client may have various triggers for monetizing hedges, which is based on what they're doing in the rest of their portfolio, that's fine. But assuming you're hedging all the time, and you don't have those sorts of external constraints, what can you do? And my argument was basically, why not rotate from one type of hedge to another type, so that you always have some downside protection in place, but you're not overpaying for stuff that is retuned? You know, by factor of 10, or something. If you have 10 delta to put at 10 bucks and it goes to 110 or whatever. At some point, it's no longer offering good value as a hedge. Either, because implied vol has gone up so much or you don't have any convexity left in the position. It's just trading like in a futures contract or something. Basically, the way I thought about it was why not show what the best hedge is at least based on the combination of experiences and tests, given the regime?

Jeff Malec: And on the put side, also, you have a zero bound, right? Like it can't go below zero, like, in theory, you can only have the put can only go up as much as the zero bound, right? As much as you would make if it went to zero.

Hari Krishnan: Yeah, yeah. I mean, of course, crude oil, people will pull that they would argue get out of the hat. Yes, in general that's true.

Jeff Malec: So, I broke you off. So, you have this monetization, then what do you roll into next?

Hari Krishnan: A kind of a spread. So you know, if the skew gets very steep at the short end, you might want to buy put spreads or even put ratio spreads, if the skew is very steep, where you're putting on a defensive position. You've got bounded risk, at least in the context of your entire hedging portfolio. But you're also monetizing some value out of the scheme. So, if the market doesn't race down from the point you put the trade on, you're building a downside protective strategy where time is more on the side.

Jeff Malec: And speak through a few of those terms there. So, the skew you're talking about in that case? Which one's more expensive that's causing that skew?

Hari Krishnan: Well, typically, again, I'll focus on equity indices to keep it easy for now. When the S&P 500 or whatever sells off. Typically, the implied volatility for out of the money options rises more quickly, or radically than the implied vol for at the money options. Now, if you believe that the speed of the selloff will not be maintained at that rate, then you're well served to buy some puts that are closer to at the money and sell some puts that are further away, simply because even though the puts you're buying might be a little more expensive than they were, the puts you're selling are much more expensive than they were. So, from a relative value standpoint, you've got a little bit of edge in the trade, but you're still expressing the downside view.

Jeff Malec: Right. And if that if it's wrong, if it accelerates out of that move, if it gets faster, you're not going to lose an unbounded amount, you're still only have the difference in the spread.

Hari Krishnan: Right. I mean, I'm not suggesting you go in and you buy one at the money put and sell three out of the monies. That's a very different trade.

Jeff Malec: Right, right. I've seen that one gets taken to the cleaners. I'm more on the upside than the downside.

Hari Krishnan: Oh, absolutely.

Jeff Malec: I digress. Okay, so what's next so that skew is high, you're going buy those spreads, right? It's still a net debit.

Hari Krishnan: Yeah, it's still a net debit.

Jeff Malec: Yeah, so you're buying that spread.

Hari Krishnan: So long protection, and you're basically just trying to skim or skim off a little bit of edge from selling the skew, but you're building a downside protective structure. And then if conditions get even worse, it becomes more difficult. Basically, what you must do is either trade Delta one or go into very short Delta Gamma hedges. I've skipped a few intermediate steps, but those are the main ones. So why what are short day gamma hedges? Well, you can buy things like weekly options. Weekly options are very expensive from a time, decay standpoint. As many of your viewers will know, if you try and plot beta, against time to maturity for a fixed Delta option, that beta tends to be very rapid close to expiration. But the good thing about these sorts of options is that you're not really paying up for implied volatility, even though it's spiked, you're more paying a fixed costs are to have a well-defined downside protective strategy in place over a short horizon. That’s mouthful, basically, what I'm saying is, you're not paying up for implied vol when people are afraid. You don't get long dated protection, that you get tons of implied convexity if the market shocks from there.

Jeff Malec: Well, it's kind of like rates, right? Like if the curve is flat, go shorten your duration? Because basically, you don't know what’s going to happen. So, get into the short end of the curve and fight another day.

Hari Krishnan: Yeah, that's a great, that's a great example. Yeah.

Jeff Malec: And Delta one, just meaning you go out right, short?

Hari Krishnan: You chase the move. You chase downside momentum in a disciplined way? Usually, that's a systematic strategy, at least in the modern age. But it basically relies upon looking for what effectively amounted breakouts on the downside, where the signal to noise ratio isn't too bad. I mean, if you're thinking in kind of filtering or statistical terms, typically when you're looking for breakouts on the up or downside, across markets, you're looking for setups where the quality of the breakout is high, so there isn't too much choppiness killing it. Now, in risk offerings you tend to get a lot of choppiness. So, there are various things you must do to try and minimize the risk of being taken to the cleaners if there's a squeeze.

Jeff Malec: Couldn’t you argue that the implied vol is there in the short futures trade as well, it's just there in the range of the trade …if you had a systematic strategy, the stops would probably need to be wider because there'd be a lot of noise on the opening range or whatnot. I could argue that that volatility is still there. But I guess it's not a sunk cost. It's just a kind of an opportunity cost. Whereas if you're buying the puts with that high IV, it's a sunk cost you don't get it back. What are your thoughts on it?

Hari Krishnan: you're right, there is an implied cost to having the wide stop and then having the stop taken out in a market with high intraday vol.

Jeff Malec: Right. And that, yeah, that delta one just kind of scares me because you could also have, and you see this at bottoms, especially right, like it might rip higher three, four or 5% someday. And then the next week, it goes another 10% lower, but you are going to get you're going to take a lot of that Big Rip higher loss. But I get what you're saying. It has to be very structured and very asymmetric in the amount it can make first the amount of can lose but seems a little problem. And is that part of your strategy?

Hari Krishnan: No, I've never done that piece. I've only done weekly options. And I've done weekly options. I hate to sort of shoot myself in the foot here. But I had this idea where this was not originally mine. But at my old firm, we were talking about how some people sort of call you up when they're in dire straits with the rest of their portfolio, maybe they've allocated to some hedge funds. And they're very worried about market to market losses, or just permanent losses. And so, they want you to hedge at the final moment. What can you do? And so, we sort of thought, while we're kind of like, people who go around in an ambulance, we realize we can't give people the best hedge. But we try and figure out what we can do that isn't too expensive but will block out the downside. And weekly options used to feature in that strategy. So, in other words, if there were some liquidity mismatches between when an investor could get out, and the risk they'd be exposed to in the meantime, and so on. And we'd go into the shorter dated expirations and try and find highly convex trades, that would at least protect them if the market went down significantly from there.

Jeff Malec: So, you're not this wasn't pure window dressing This was that served a function?

Hari Krishnan: It did. It's not the best job, though. I mean, the reason I said I'm shooting myself in the foot is because the core of this business I hate to put it crassly is running a sustainable business with recurring revenue. And to just wait until somebody calls you up on the bat phone. Yeah, that's tough. It's a business that no one else did. Probably because no one else wanted to do it. But we'll say quite an interesting one.

Jeff Malec: Right? Will you be the ultimate poker player of like, leather asses they call it, right? Just sitting around for years and years waiting for the phone ring, then you're in high demand. Right? So, you are waiting for the right hand, but might take a while to get that hand. And so that's interesting. So that, but would that be part of the actual strategy as it exists today, the Delta one futures?

Hari Krishnan: Just a block out just to sort of create highly convex outcomes if the market is ripping, ripping down. And the basic idea there is there is some statistical evidence that supports doing this in certain setups. And I'll give you the intuition first, which is that, you know, a lot of people say that, you know, markets, it's good to buy the dips, and that's generally true. In the average case.

Hari Krishnan: But the danger is, if the market goes down, let's say 10%, intraweek, it could really melt down in the next few days, the odds of very significant, liquidation actually increases because people can sequentially get flushed out of the market. And there is a lot of statistical evidence that suggests that markets have the fattest tails over horizons of a week or less. And so, if you're seeing a fat tail sort of dynamic emerge, buying a weekly option at a fixed cost, probably a sunk cost, but not necessarily, is a good way to play. And I sort of think that the markets don't really understand that because I've tested it. And even though weekly options have steeper skews, and higher implied vols, I don't think, in general, that the markets adjust enough to it, they don't realize how fat the tails really are over short license. And, you know, this is one of the early things that was done in this field called econo-physics where people would just tabulate returns. And so, they take like a series of prices for natural gas or S&P or 10 years 10-year notes, or whatever the future is, or whatever. And they would say, well, let's slice up the prices into one-minute intervals, 10-minute intervals, one-hour intervals, one day, two days, and so on out to weeks and month, and they basically built a different distribution each time. And they found the tails were fattest, relative to the standard deviation. So, they normalized these distributions for short horizon price action.

Jeff Malec: Like all the way across the timeframe down to the minute or was in this hourly or daily or weekly?

Hari Krishnan: One minute, you get tons of four plus standard deviation moves. I think anyone who say traded bond futures will have seen that. Mega moves on macro announcements or liquidations or whatever risk off events are quite often. Remedies it's a little less common, but the same pattern persists where the frequency are high standard deviation moves, especially down for equities, is much higher than then over short horizons than it is, say monthly. Where the return looks normal.

Jeff Malec: So that seems to make sense, right? Like, the longer the timeframe, the it's going to smooth out more.

Hari Krishnan: Yeah, exactly.

Jeff Malec: The shorter the timeframe, the more apt you are to have just a run of, you know, in statistics speak, you're going to have a run of bad luck, a run of your flipping the coin, you're going to have a run of tails, so to speak, versus on the whole 10,000 flips, you're going to see it smoothed out. Which also made me think you think we'll ever see like daily or hourly options for that. Right? If that plays out. The exchanges will be like, hey, look at all the volume we got with weeklies, l let's offer up some dailies. See what happens.

Hari Krishnan: Well, once a week, you do get a daily one.

Jeff Malec: Yeah, true.

Hari Krishnan: As they are out there, but just not every day. I mean, I suppose you could set the flex options too. But I don't know if you'd find a market for that.

Jeff Malec: So, let's talk a little we just came through kind of a real time test of your thesis here and of your book and, and what's going on. So, did it play out as you expected? Any different pieces? Did we see a second leg? Or was that kind of just a one-legged monster there? What are your thoughts on all that?

Hari Krishnan: Well, since I wrote the first book, some things have changed. And that makes the book a little bit dated in one or two ways. Generally, I think the thesis is still very valid. But something that I've noticed since 2015, let's say, but more prevalent. It's been more prevalent since 2018, has been the risk of the VIX spiking by a large amount from a low level. It used to be that you didn't get 10-point spikes from 15. I know, there was a flash crash in 2010, where that sort of thing happened. But things like the volmaggeadon in February 2018.

Jeff Malec: That it started to creep, it crept up crept up a few points before the VIX spike. But yeah, I get what you're saying.

Hari Krishnan: But it was the handle was below 20. And we have the same thing here, where the VIX wasn't very high in Feb. And that just blew out completely going into March. And so, this makes life a little bit more difficult for the standpoint of looking at hedges sequentially. Um, the other problem with that the other thing that's changed in the markets quite a bit, although it hasn't happened as much this go round, has been the tendency for the VIX to get slapped or volatility to get slammed, as soon as things settle down. There would be will be a scramble for people to short vol as soon as they thought the coast was clear. And you could look at something like the half-life of volatility across markets, and it had clearly shrunk. So, in other words, you said, Let's measure the spikes in the VIX or the TVIX before it got discontinued or a currency VIX. And then let's see how long it takes to go down from the peak to 50% of the way from the initial level to the peak. And that is much shorter than it used to be, at least until this go around.

Jeff Malec: Right? I think people are expecting it to snap back a lot quicker in April and May.

Hari Krishnan: It did and in other markets it did kind of come down more. In treasuries if you look at the move index, it's trading at a very low level now. It’s just equities seemed credit spreads have come in quite a bit. Equities seem to be the outlier there. And the other thing that's quite interesting about now, again, I don't want to focus too much on the negative in terms of predictability is that, as others have remarked, I'm sure people on your show have and you have as well. There's a strange kink in the term structure of volatility with the huge loading in October, November, October, November, probably based around the election, but almost certainly. But that's pretty unusual to usually it curves around upward sloping or downward sloping.

Jeff Malec: Some of our guests have said it's based on a contested election, not just who wins it, but whether or not it gets verified or not.

Hari Krishnan: Yeah, that's a great that's a great insight. But if that was strictly the case, if everybody believed that, it should be higher than they are as well, because contested election means continued on certainty into the further out months.

Jeff Malec: I think Chris Cole when Twitter was coming back with that exact point of like that, that doesn't make sense, then it would be elevated. He's actually saying if there is, that's all way under price.

Hari Krishnan: Yeah, what has actually ratchet it up a little bit? But yes, yes, he's right.

Jeff Malec: Yeah, we've seen Oct kind of come down in the back months go up, much to the chagrin of a lot of vol arb guys that we work with.

Hari Krishnan: Not surprised. Yeah, but the other thing is that sort of held true, the skews gotten steeper, the correlation of vol across markets is very high. Which means that in February, March, it didn't matter where you had, you would have made a huge return. You didn't need to be a genius, then if you if you still had assets, and you were still loaded in your positions, and weren’t getting cues, no matter what you had on.

Jeff Malec: So, when in terms of your thesis, Jan and Feb. Option, Vol was cheap, so to speak. So, you were just buying out of the money put. Then explain March and April. So, it got when would you have per your thesis, let's not talk actual trades.

Hari Krishnan: But for your early March before the low in the market, I would have been rotating into spreads, I would say and at the end of the first week. So, I would have missed the full power of week two.

Jeff Malec: So, when we were down 15 or 20, I can't remember….

Hari Krishnan: Yeah, by that by that point, the skew was pretty steep. So, I would have been trading spreads. At that point, the spreads could have been pretty wide, and there still would have been gains to be made. Probably by mid to late March, I would have been in sort of broken flies and things like that. So, I would have lost money moving forward through that. But at a much slower rate than people who didn't monetize their hedges.

Jeff Malec: Explain a broken fly for people to think that's a zipper.

Hari Krishnan: It's a zipper as well. How do I explain it without being too technical?

Jeff Malec: Yeah, well, we got a butterfly.

Hari Krishnan: So you've got a butterfly, let's say you buy one app and might be put, you sell to someone out of the money puts, and you cover all the downside risk by buying an equally spaced away out of the money put. So, you might buy one of the one put at the spot price, sell to the 5% below and buy one that's 10%. For broken fly, the spacing is naughty. What you're doing is you're taking as much as you can from the skew, but you're imposing the constraint that you want to make money all the way down. So, you make some amount of money all the way down by buying that far out of the money put a little closer than you otherwise would. Ah, just to make sure that you have a true hash. Um, but at the same time, you're trying to get it squeeze as much out of the skew as you can. So those sorts of trades would have been attractive at that point. But they would have been very wide. There wouldn't have been 05 minus five and minus 10. They might have been zero minus 10, minus 20, or minus 15 type hedges if they were broken. There's a lot of space on the downside.

Jeff Malec: Why do you think investors are still you know, in that March period? Is it just panic? Just fear? Right? Like, why are they so willing to pay up for those options, when at some point, it's just a losing bet, right? Like at a VIX of 80? Is the market really going to get more volatile from there?

Hari Krishnan: People operate under 70 constraints. And it just takes one prime broker to panic. And to one, you know, one senior risk manager at the major PB to panic and say..

Jeff Malec: Blow it all out, I don't care what it costs.

Hari Krishnan: And people just have to unwind. They they're not able to sort of hang in there by trading a spread around the position or cutting by 10%. They just have to buy vol at whatever level. I mean, there used to be an idea that I had, which is it's a bit like the no negative price idea of futures, which said that, while the VIX can never go above say 150 because if it went up and down, limit upper limit down every other day, realized vol could never get much higher than at 150. So, you would have to be a seller around that. In 2008 if you looked at the implied correlation of all the stocks in the S&P 100 let's say, which can be derived from the relative level of implied volatility index, versus the average implied falls for the stocks in the index, you could wind up…there was a time when you wound up with an average implied correlation above 100%. Simply because the market was clamoring so much for just slapping on index protection, macro level protection. These absurdities can count when people are just forced to cut risk.

Jeff Malec: Is there a flip side of that, that the people aren't able to add risk at those same points, right? There are people who want to sell into that volatility, but maybe they're risk constrained by whoever's in control their risk book, or they just don't purely have enough capital to put it on in size.

Hari Krishnan: That's a great point. I mean, it's a one-sided market, when that happens.

Jeff Malec: Yeah, but not necessarily just because of fear, but because of other economic factors as well.

Hari Krishnan: Yes.

Jeff Malec: Um, so a point, everything we're talking about here, and these people are buying that up to do with a hedge? Like, how do you conceptualize and how did you get into this world of direct hedges versus like you were at a global macro firm of like, "no, just add this piece, and it's non correlated, and it should do differently in a crisis." How do you view those that difference?

Hari Krishnan: Well, I mean, I think there's three ways to hedge; one is to say, I'm going to pay a fixed amount of premium every year, and provide something like fire insurance on people's houses, you know, where there is no real edge in the strategy, but people know what they're getting going in. And if it's run efficiently and well, there won't be any unpleasant surprises. The second thing you can try and do is to say, well, I'm really a hedge fund that specializes in downside protection, trust me, I'll do what I do. That may give maximum flexibility in terms of cutting costs. But it also creates an open-ended question as to what is really being achieved with the hedge. And the third thing is the other area that actually do so I don't do number two, but I do one and three, which is to say, how close how closely can I come to replicating a volatility index like VIX, while minimizing the carrying costs associated with that. So, I do direct hedging, and I also do volatility replication. Those are the two different things. I don't do the stuff in between, mainly because I think it's very hard to sell it to people who think in terms of insurance, you know, people who want the more predefined payouts that an insurance policy would deliver. I mean, ultimately, that's the most flexible way to do it. But I only do one and three. Now, in terms of direct hedging, even that requires a bit of finesse, as we have seen many times which you understand as well as I do, which is that the cost of insurance is not static over time. It's not as though you can diversify across thousands of uncorrelated insurance policies and constantly priced things in the same way. The markets trade… you simply cannot go out and buy as much insurance at the same levels as you can when the market is complacent. So, finesse, but assuming that you do apply some reasonable hedge fund style techniques to supply them I think that's a very good strategy just to avoid overspending.

Jeff Malec: You made me think of a friend who worked at a *cat bond reinsurance some sort of hedge fund* so they would be selling like hurricane insurance or re-buying the reselling of that hurricane insurance. She would always be like oh, we just want a smaller hurricane…we don't want anyone get hurt don't want a lot of damage. But if it can push premiums up a little & the insurance repricess the odds are still the same right of the next hurricane hitting the odds don't really change. But when the one hurricane comes through, it pushes up premium, I guess they're allowed to sell it for more because people are fearful. But the man very good living I think that's a good business, we need to analyze at some point. But um, and then another thought there so I hear everything saying but you personally, but to me, it's interesting of the investor side. How do you see split but to me, it's, I think, maybe 70/30? The other way of people just saying, I don't want to do direct hedging, I'm just going to do a add 40% bonds or buy some gold. They're thinking sort of hedging, but they're more thinking asset allocation and diversification. So, I guess the question is more, do you how do you tell people there's a need for this direct hedging component instead of just relying on this nebulous concept of asset allocation and diversification.

Hari Krishnan: Well, if someone issued guarantee that treasury bonds or government bonds in general would rally in every crisis from now on to the end of time, and also that the yield curve would be upward sloping from now until the end of time, as a strong case to be made for just buying treasuries as a diversifier. I think if you go back far enough over time, maybe this is a Chris Cole, type of thing again, you'll find that bonds haven't really provided reliable protection, over many decades, maybe since the 80s they have but since the secular bull market in government debt, but not before that. And if that ever changed, and if you think of the risks purely in terms of where yields are, these will be where they can go. This whole idea that you that sort of riding that camel until it falls over by diversifying into bonds, or coming up with some clever looking scheme, using a bunch of fancy math that basically forces you to allocate lots of bonds may fail, and I worry about what other people are doing in that regard.

Jeff Malec: Was that a veiled nod to risk parity?

Hari Krishnan: It is a well, not so vieled…

Jeff Malec: Not so veiled, as it turns out, okay.

Hari Krishnan: Not so veiled. But I mean, I understand why people do risk parity. It looks great in the back test. And if you operate under the assumption, the bonds will rally in flight to quality, fine, it's probably better than hedging, but that is a heroic assumption. Bills are globally close to zero. Okay, maybe they can go negative, maybe you can make some money on roll down. But at some point, with a perfectly flat zero, yielding curve, the risk has to be asymmetric to the downside, at least for prices. That's a wise go to hedge in the medium-term future.

Jeff Malec: as an investor that the calculus is, is the basis risk of those non-guaranteed diversifiers greater than the cost basis of doing the direct edges, right? Yeah. But diamond with you have bonds, especially now when they're yielding nothing like in the past, hey, if they're wrong, and they don't do a flight to quality, at least I get this yield. But now it's, you know, you you're just relying on that flight to quality aspect.

Hari Krishnan: Yeah. I mean, it's one of those things where, you know, if you had a yield curve, I wrote this in the first book that where the yield was zero for maturities, zero years to nine years, 364 days. And then the 10-year yield was one basis point. You'd still be able to buy bonds in the sense that you could buy a 10-year bond every so often. And then when it became less than a 10 -ear bond, it would reprice, then you could dump it and then buy another 10-year bond and do it again. Which is effectively what the futures do, because they have been under the curve. Yes, so trading the curve is one way to make money without yields being high. But even that becomes increasingly difficult when the short end is pinned at zero or near zero. And the long end is vectoring, down in there. And so even that trade eventually gets squashed.

Jeff Malec: Yeah. And even managed futures last year, in 19 made money and booms and a bunch of negative yielding debt because it basically got more negative yielding. So that can happen but seems an odd bet.

Jeff Malec: So back to options. You know, we're seeing all this talk, which we touched on earlier, like the gamma hedging and Robin Hood, retail option flow. You kind of see this as a golden age of option trading, like anyone with an internet connection can trade an option? And if that's the case, or maybe Golden Age is the wrong word, but seems as if there's more people in the world today than ever before that can trade an option. Is that a good thing for you, for market makers, for those people?

Hari Krishnan: Sounds good on average for those people. I think the reason they're trading options isn't just that they're ultra-bullish and they want to load up with implied leverage on the upside. It's also because the places they're trading through the platforms they're trading through, probably won't allow them to build significant positions without trade options. So, they're kind of forced into it if they really want to make a big return on their investment.

Jeff Malec: Well and or they offer free stock commissions, you pay a commission for option, their incentive to push you into options.

Hari Krishnan: They kind of steer you in there, that's right.

Jeff Malec: And then the apps and everything are all gamified. Have you tried options in? You know, so there's that component of it as well. But I would agree like it I don't think it's a net positive for society that a bunch of people are our trading options and oh, this is easy. I just buy a call. I don't have to put up much money that Tesla goes up, cash out.

Hari Krishnan: And I feel very bad because some of my favorite finance you know, podcasts, they have commercials that are interrupted by commercials, maybe I should get the proper YouTube subscription. But yeah, interrupted by commercials where people are making outrageous claims. Oh, yeah. In the middle of a perfectly good, sensible show.

Jeff Malec: We don't have ads.

Hari Krishnan: Wise Man.

Jeff Malec: But I'm always like, and then or right, you have some unless you can control not just who but also the content…gets a little dicey.

Hari Krishnan: Yes, I don't think it's a net positive for society. I mean, you know, the fact that you can trade options with bounded risk doesn't mean that you don't have risk if you buy a lot of options, right, you can still burn all the premium. And, you know, if you're too aggressive in spending that can lead to problems as well.

Jeff Malec: And I brought this up on our pod talking about this gamma phenomenon, of, if most of these people are losing money, like is that eventually going to dry up? Right? If they're all buying and the dealers are marking them up? Because they have to protect their risk, and they have to make money? In theory, if they're marking them up correctly, then it's just a directional bet that 50/50 at best, right?

Hari Krishnan: It's a negative edge game for the buyers.

Jeff Malec: Yeah, so those buyers are eventually going to lose money. So, does that flow dry up? Is there a never-ending flow of retail that's going to, you know, replace the ones that are losing money?

Hari Krishnan: No, no, no.

Jeff Malec: Right. And not without basic income in the US, and maybe they need both basic income and option trading income. Like, here's your $800 check a month, and then here's your $200 check a month to buy options.

Hari Krishnan: Yeah, it's funny, because a lot of people are unwilling to take options in their career discussions. But they're more than happy to make bets with negative expected returns in their retail accounts, trading options. And that's a bit unfortunate, because they can get some of those options in their lives for free. I feel sad that that's the case.

Jeff Malec: But it's the same, it's like the gamblers on a craps table, they'll bet on the worst possible statistical odds, because it's a big payoff, it's 12 to one or 21, or whatever, even though the true odds are 101. Or they'll do and football, they'll bet on a 16 parlay because it's 10 to one odd. But the true odds of that happening are 50 to one, I don't know the numbers exactly off the top of my head, but people just they're willing to do it, because it's a small bet for large return, even though if they you know, and then the lottery is the ultimate example of that, right? So, I put in my dollar, and I could win a billion dollars. But I always said, would you play the lottery in reverse? If the lotto sent you $1 every day, but you have a .0000 or whatever, six chance of eventually, they could come and take everything you own away plus that of your ancestors. And everyone right? You'd say no way. But in theory, mathematically, it has the same expected return, right? Yeah,

Hari Krishnan: Absolutely.

Jeff Malec: Right. But no one would say, yeah, I want to take that dollar every day.

Hari Krishnan: That's a good one. That's a good one.

Jeff Malec: Which brings me to have you ever been tempted by the dark side, I'll call it of selling options, which is kind of that same.

Hari Krishnan: I've never been an outright seller, but I've done spreads that I've gotten burned on. About 10 years ago, I was doing calendar spreads in the Euro stocks. And basically, the this was 2011. And the term structure had become very steep for all the solvency crisis related issues. And so, I had this notion of buying. So, these were kind of deferred in the term structure. So, I was buying front month options and then selling twice as many further out of the money back month options. And I got burned because nothing much happened until late in the expiration cycle. And then all of a sudden there was a shank and even though it was long gamma I was short Vega effectively and the Vega posed some problems. I was able to block them out the risk by just buying some ridiculously low strike puts below, sinking the cost and then taking a moderate loss on the short puts, but not getting not getting seriously damaged. But yes, I have ventured into the dark side and spreads, but never leveraged naked shorts.

Jeff Malec: And what would you say to that mostly retail crowd that's out there selling those naked, if they're allowed, I don't even know if they're allowed to do that anymore. But, I mean, I know regulatory wise, but risk wise.

Hari Krishnan: If they're allowed, just don't do it. It's just like, life isn't worth that. You know, the stress is just amazing. If you have open ended risk, and you need the market to come back in very short order. That's, you know, it's just simply not worth it.

Jeff Malec: Or just buy and hold Tesla's right. Just buy and hold some stocks, if you want that risk profile.

Hari Krishnan: And buy penny stocks or something.

Jeff Malec: You're not even penny, but just the which comes to me, like if everyone's trying to hedge everyone's trying to do something, if you had this 50-year view, you'd be like, yeah, it goes down. It always comes back up.

Hari Krishnan: Right. That's why penny stocks are the wrong example. But yeah, yeah, your case is good.

Jeff Malec: But what do you say to that to people? Like, why should I hedge it? It always comes back.

Hari Krishnan: It does. But people have a tolerance for pain and their ability to keep the position going is not indefinite.

Jeff Malec: Only takes one time of it not coming back. Yeah, it could come back 99 times. And then that hundredth time, you're out, you're done. So, I wanted to ask you what you think is one of the most commonly misunderstood things about options both for retail traders and for professional traders.

Hari Krishnan: Well, one subtlety I like to talk about is that if you buy a very long dated option, it doesn't matter really, if you buy if it's got a low Delta doesn't really matter. And unless you take carry and interest rates into account, that's significant. That's something a lot of people don't get. The other thing is that a lot of people worry about the wrong Greeks for certain maturities. I don't care about low interest rate sensitivity for one-month election, I wrote down too much about it. But I should care a lot about dividend yields and interest rates for longer dated stuff. So, you know, I often tell people that if you're trading a one-month option, versus a one-year option, you're actually trading two very different things, even if they're both books. And so, looking along the surface, you've really got a whole panoply of different strategies embedded in there, if you just take the time to take a look at it.

Hari Krishnan: The one other thing I'd say is that this every dog has its day type message is an important one. Any option strategy is going to have setups to work well for even the silliest one. And even the best strategy is going to have gaps or holes in it. Situations that won't play out. The question is do you understand what those scenarios are? And are you playing the right strategy, statistically, or probabilistically or gambling wise, based on what the market is giving you now. That's what options trading is about. It's a potentially combined directional and vol bet with an emphasis on Vol. And so, you want to be doing the right sort of structure given what the market is providing for you.

Jeff Malec: And we see that in Chicago prop firms, you know, option backgrounds have, they just go into those environments that are right for their strategy, and they'll step aside or they'll go into other markets where that's right for him. Don't force it.

Hari Krishnan: Yeah, you should never force it. I mean, so for example, we have a VIX replication strategy. And basically, it does well, if the VIX flatlines or if it explodes. It doesn't do well if the VIX trends up. But, you know, the bet we're making is that the VIX generally doesn't go up by one or two points every week. It either spikes or it flatlines or it decays. And so, if you can create those setups in your strategy, or any of your strategy, that's, that's the best you can hope for. And if you play consistently, you have good shot at success.

Jeff Malec: And then I should've asked early, but so your strategy. Are you offering one strategy to investors are you let them come in and create a bespoke product?

Hari Krishnan: Depends on the mandate. I do as you as you mentioned, we do sort of classical hedging where we have a somewhat on constrain strategy of buying downside equity index books, we do the replication strategies. And we also do customize bespoke stuff where if a client wants to hedge a single position or has a specific exposure to a currency or something we can, we can block out the risk efficiently there too. And for international client's currency risk is very significant. So that's one of the things we have in our arsenal.

Jeff Malec: So, if someone has a huge Apple position that's grown 10s of millions of dollars or something comes to you and you'll say, all right, here's how we can protect that, that kind of thing. And what, speaking of Apple, what do you think on just as the kind of winner takes all economy and FANG is just becoming larger and larger portion of the indices? Is that an issue for index option pricing? Or it all gets kind of baked into the prices? It doesn't matter. What are your thoughts on it?

Hari Krishnan: The S&P 500 still pretty diversified, the NASDAQ less so, it is a problem. It's definitely a problem because aside from its being a societal problem, which I won't go into. It just naturally reduces the amount of diversification in the markets. And one of the problems that have been the case, it may still be the case is people trading a small number of names actively, and then just passively going into everything else. That's not a healthy market. There's no relative value really to speak of in a market like that. It's just performance chasing plus passive investing.

Jeff Malec: And in theory, the smaller the basket, the more volatility it would have, right? Less of that smoothing effect. So, in theory, you could see as if that becomes more and more of the case, it'll either be under the volatility of the index, will be underpriced or it's just going to reflect the volatility of those individual names.

Hari Krishnan: Yeah, exactly.

Jeff Malec: Which I'm sure there's tons of strategies out there right now of doing that arb between the, the, the index vol and the single name vol, which brings us full circle to what you used to do at the back in London.

Hari Krishnan: That's a long Yeah, let's go a long, long time since we did that stuff.

Jeff Malec: Great. So, I'll go through a few of your favorites here and the pie. So favorite, marathon location?

Hari Krishnan: Copenhagen or San Sebastian.

Jeff Malec: San Sebastian, that's the northern coast of Spain there

Hari Krishnan: That's in the Basque Country. Yeah.

Jeff Malec: Yeah. And that don't have like four Michelin star restaurants or something. I think there's a lot of good spots there.

Hari Krishnan: Oh, it's fantastic for tapas and the whole thing. It's quite nice. It's a different culture from most of the rest of Spain. Fantastic.

Jeff Malec: I'm going to go there…. you can surf there. I think there's some surfing good restaurants.

Hari Krishnan: If I knew how..

Jeff Malec: I'm not going to run a marathon, but I'll check out the rest. And best hotel and your marathon travels.

Hari Krishnan: I've never stayed at a fantastic hotel on the races. But the Radisson Blue in Copenhagen is nice.

Jeff Malec: All right, I like it. Favorite. Well, you have your PhD in chaos theories, we could do a whole other pod discussing. My wife's cousin's husband is an artist and sculptor. He's a mathematician, but he's also an artist and sculptor. And he will do mathematical formulas in art form. So, you've seen those chaos, fractals and stuff like that?

Hari Krishnan: Oh, yeah.

Jeff Malec: Yeah, he's about he taken it to another level of like in different formulas instead of just those fractals of like, here's, um, I don't know enough to tell you what he's painting or what he's sculpting. But it's quite interesting.

Hari Krishnan: That's above my level of expertise. But yeah that's interesting.

Jeff Malec: And I was philosophy major to me, the further you go in philosophy, the closer you get to math, it might be the same way. The further you go in math the closer you get to philosophy. So that was a long way of saying favorite mathematician?

Hari Krishnan: When I was an undergrad, I liked Cantor, because he had all of these different levels of infinity. He's different. There could be various sets, and they were all infinitely sized. But some were a whole lot bigger than other ones. And that blew my mind.

Jeff Malec: That just blew my mind. Okay. He went. He was the precursor for different stages of a crisis, different levels of infinity. Alright.

Hari Krishnan: That's far more sophisticated than anything.

Jeff Malec: Uh, so favorite city you've lived in.

Hari Krishnan: When I was a baby, I lived in Geneva, but I didn't remember too well. London was good. I lived in Chicago for a bit. That was great. When I was younger. I might either go with Chicago or London for various reasons. Chicago was great back in when I was there in the late 90s. Because it was a friendly city to just go around.

Jeff Malec: Yeah, it looks worse on the news. It's still pretty friendly. But it's been looking pretty bad on the news here like lately. We've got a bit of some tax and finance and pension issues, but we'll take it. I think a lot of I think a lot of people just say Chicago to not hurt my feelings, but I appreciate it. And your favorite Star Wars character?

Hari Krishnan: I'll go with Chewbacca.

Jeff Malec: Chewy. All right. Can you do a chewy?

Hari Krishnan: No..

Jeff Malec: Well, thanks so much for your time. I look forward to seeing you in person one of these days when we get a vaccine or can go out do whatever, but uh, until then. You're rather anonymous on the internet, but you don't have Twitter or anything like that.

Hari Krishnan: I would, but you know, it's a question of just keeping myself under control,

Jeff Malec: And how you would be great. I'd look forward to that. But we'll put the website out on the show notes and whatnot. Thank you!

Hari Krishnan: You got it **Jeff Malec**, all the best.

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