"EXCHANGES AT GOLDMAN SACHS" PODCAST WITH SHEBA JAFARI

JAKE SIEWERT

This is Exchanges at Goldman Sachs, where we discuss developments currently shaping markets, industries and the global economy. I'm Jake Siewert, Global Head of Corporate Communications here at the firm. The question of today's episode is: does human behavior move the markets? To answer that question we're joined by Sheba Jafari, head of the Global Macro Technical Analysis team in our securities division. Sheba, welcome to the program.

SHEBA JAFARI

Thank you so much for having me.

JAKE

So, Sheba, give us a little context on how markets would behave if they were completely rational, and immediately and efficiently priced in every event.

SHEBA JAFARI

Well, for starters, I would be out of a job. Right?

So the question really just calls upon your textbook

old-school theory of efficient market hypothesis.

And in efficient market hypothesis, the

claim is that all investors make informed, rational

decisions. You and I would weigh out events and

data points identically, and immediately adjust our

portfolios accordingly.

Market movements are entirely random and

unpredictable; prices fully reflect all available

information, and there's really no arbitrage or

profits to be made. And in this perfect world, the

economy distributes all resources in an optimal

manner, so there's no alternative allocation which

can make one person better off without making

another person worse off.

JAKE SIEWERT

Right. So you've studied this quite a bit.

SHEBA JAFARI

A little bit (Laughs).

JAKE SIEWERT

Yes. What does the empirical evidence suggest about the efficient market hypothesis? Are markets completely rational?

SHEBA JAFARI

So I love this quote by Keynes: the market can remain irrational longer than you can remain solvent. (Laughs) There are really two problems with the efficient market hypothesis. Firstly, the fact that information is disseminated equally to every market participant. And secondly, most importantly, that you and I will process that information in a similar, rational manner, the same every time.

So we'll tackle the first problem. With the onset of

computers, the internet, access to information, all of that has helped to improve the speed by which we access information. And that's efficiency enhancement, no doubt about it. But on the contrary, technology doesn't always make markets more rational. In fact, I would argue that while traditional inefficiencies of the past such as delays in access to information are diminishing, we're getting new types of inefficiencies.

So let me give an example. We didn't have the internet 30 years ago. Now we have probably far too many sources of information. These provide contradictory truths, unreliable data points, noise. And as a result, the information is asymmetrical and imperfect. Not to mention there's a number of structural constraints that impact agents, and create pockets of inefficiencies, and that can be as basic as your accounting constraints.

Regulations on when investors need to close their books at the end of the month, or at the end of the quarter, at the end of the year. And they will tend to trigger outside moves. People optimizing for different time horizons, different mandates, liquidity constraints; the list goes on. And the way that I see it, I mean if we kind of turn the question on its head, there are agents, and then there's aggregates of those agents.

So the question isn't whether the agents are rational. I have no doubt that you and I are rational human beings. The question is really whether or not the aggregates of those agents, the marketplace itself, is a rational entity.

JAKE SIEWERT

So give us a couple of examples of how human reaction to different events has an impact on

trading decisions.

SHEBA JAFARI

So I'll take a very normal everyday analogy. Have you tried to make a restaurant booking in New York recently?

JAKE SIEWERT

I have.

SHEBA JAFARI

Yes (Laughs), so I have about three apps on my phone at the moment; there's about 25,000 restaurants in New York City and Manhattan area, and you would think that we wouldn't have a problem getting into a restaurant on a Saturday night. The problem is, is I don't want to go to any restaurant; I want to go to a restaurant that has a vibe, that has a really good chef, that has a good reputation.

Let's imagine that you walked into a restaurant that

you made a booking to, and it's an enormous restaurant and it's completely empty, and there's five waiters waiting to wait on you. Chances are you're probably going to turn around and walk away, right?

JAKE SIEWERT

There's something wrong with this place.

SHEBA JAFARI

Yes. (Laughs) Now, if you take the opposite and you're walking down the street, your normal neighborhood, and there's a new restaurant that's just popped up. And there's a queue out the door, down the street and around the corner. That would be intriguing to you, right? You'd want to know what is it about this restaurant that entices people to want to wait an hour or even a few hours.

In my opinion, the mere fact that we have the existence of bubbles indicates that markets are still

run by emotions fear, greed and hope. And just to name a few, we had the dotcom bubble, we had housing crisis, silver bubble, Asian financial crisis.

And just last year, Bitcoin, right? And there are a number of reasons why a bubble can develop. In essence, it's a narrative. Whether it's rational or irrational doesn't matter; it triggers a human and machine-driven reaction, which will impact the way that someone looks at their trading decisions.

And the other thing that I would mention about bubbles, which a lot of times when people have this discussion, they don't really bring up this topic, is that at the onset of a bubble, the perfectly rational thing to do is to trade the bubble, right?

JAKE SIEWERT

Yes, it's just the trick is to not stay in it longer.

SHEBA JAFARI

Yes (Laughs).

JAKE SIEWERT

Than you need to.

SHEBA JAFARI

Greater fool theory, right?

JAKE SIEWERT

Yes, exactly.

SHEBA JAFARI

But let's be honest, in hindsight, we would have all wanted to buy Bitcoin in 2015, right? (Laughs)

JAKE SIEWERT

Yes. So connect that dynamic of bubbles, or crowding, as it were, to the work you do here at Goldman, that technical analysis. And so what's the framework you use when you're looking at markets, and what are you trying to figure out and predict about how human behavior makes the markets less efficient than they would be otherwise?

SHEBA JAFARI

Okay, so we'll start out with technical analysis. The goal of technical analysis is really to describe the aggregate behavior of the market. And the assumption behind technical analysis is that markets follow specific patterns, and that those patterns are not only identifiable, but they can be predictable.

The framework that I use personally is called Elliott Wave Theory. And there are two assumptions being made here on top of the standard premise behind technical analysis. So in Elliott Wave Theory, the markets are suggested to move in a fractal manner, and they respect the laws of the golden mean or specific well-defined ratios.

So with respect to the fractals, if you ever read or heard about the professor Benoit Mandelbrot? He

demonstrated that there are natural forms in life and the world that are self-similar. A wave in the ocean isn't all too different in structure, pattern, composition, whether it's 100 meters high or a couple of inches. Branches off a tree look like smaller versions of the tree itself. So Elliott Wave Theory puts forth that, similar to nature, major bull market structures are no different than short-term swings and daily fluctuations.

And the second assumption is even more interesting, and I would argue even more beautiful. It's this concept that the golden mean is everywhere. So the golden mean is this concept that we learned about in statistics class some years ago, right? And it's basically a single ratio, 618 specifically, that defines the shape of whirlpools, ocean waves; anything as small as the growth of bacteria to the formations of the galaxies, the

mapping of human life, the population growth.

And in fact, Elliott Wave Theory suggests that the same law that shapes living creatures, organisms, galaxies, is inherent in market price action, which is intrinsically driven by human behavior. And I would argue that this is true not only for human behavior, but also machine behavior.

So when I started my career, I used to often say that I'm an anthropologist of the market reaction function, or of humans, right? And just in a simply different format. Now all that's changed over the past five to seven years; I'd argue that I'm an anthropologist of human and machine behavior. And it doesn't necessarily mean that it's less effective; it's just changed.

JAKE SIEWERT

So let's talk, I mean honestly the markets have

machines and machine learning and AI and big data have all become much bigger factors in the market. But at least at some level, and you seem to suggest this, machines are only as good as what the humans put into them. So are the machines mimicking human behavior, and as a result, are they prone to the same biases? Or can somehow the machines remove an emotional element that makes trading less efficient?

SHEBA JAFARI

It's a really interesting question. If we go back to what we were discussing earlier, which is that the speed at which information is distributed, with the onset of machines, we've achieved incredible speed, immense data analytics. We can solve complex problems that maybe we'd never be able to solve ten or 15 years ago. Not to mention the liquidity that it's provided, the spread compression that wouldn't be possible without machines.

The irony is that while we are ruling out older inefficiencies, there has been an emergence of new types of inefficiencies. For one, there's been an increase in flash crashes over the past ten years. And these are happening in pretty liquid markets, so S&P May of 2010, U.S. treasuries October 2014, sterling in October of 2016, and VIX in February of last year.

One theory behind this increase in flash crashes is that machines are unable to process complex macro surprises, the way that more fundamentally-informed traders might. So the response is to withdraw liquidity, and even sometimes switch to demanding liquidity from the market rather than supplying it. So you have this really interesting dynamic where, during periods of complex fundamental scenarios, it's humans that gain the

informational advantage, and machines that regress.

And I thought it was interesting to read personally recently that a 2011 report commissioned by the U.K.'s Government Office of Science explains how computer-based trading environments may actually reduce the diversity of trading algos, making them more vulnerable to herding.

JAKE SIEWERT

Yes, they're crowding; they're all doing the same exact.

SHEBA JAFARI

Yes, exactly.

JAKE SIEWERT

So, given that backdrop, what are our clients, the clients you're interacting with, what kind of questions are they asking right now? And obviously some of these clients are quant traders

and some of them are more human active managers, traditional managers.

SHEBA JAFARI

Yes, I mean I cover everyone.

JAKE SIEWERT

Everyone, right?

SHEBA JAFARI

Everyone. It's hedge funds, real money, corporate guys, banks. I'd say some of the questions that people are asking, we've been in a 30-year bond market rally. Two-year yields have gone from seven percent to less than two percent over the course of the past ten years; less than ten years. We all know that it can't go that much more than zero.

Clients are wanting to know what that means for bonds, what that means for equities, what that means for the macro environment. And on top of

that we're seeing this stark breakdown in correlations. Bonds have rallied in an almost straight line since October of last year, and S&P dropped 20 percent from October to December; 25 percent rally from December through to April. And then basically so your classic economics textbook will tell you that higher bonds mean lower yields, and therefore easy money, which should stimulate the economy. But we've seen a number of instances this past few years where those standard relationships have broken down.

So in contrast, technical analysis focuses less on those equilibrium theories, and more on the context of the market and the aggregation of those market psychologies. I'd say one thing people aren't asking about, which I think is interesting, is Bitcoin. Two years ago, a year-and-a-half ago, it was probably the most popular.

JAKE SIEWERT

Everyone was asking about it.

SHEBA JAFARI

Everyone was asking about it. I've got one or two

clients, you guys know who you are, but (Laughs).

JAKE SIEWERT

Well, it's back a little bit right now, so at least I don't

know if it's a bubble, but it's back.

SHEBA JAFARI

Yes (Laughs).

JAKE SIEWERT

So how did you end up in this field, in technical

analysis?

SHEBA JAFARI

Well, I had no idea what I wanted to be when I

grew up. I certainly didn't ever say that I wanted to

be a technical analyst when I grew up.

JAKE SIEWERT

Did you know what a technical analyst was?

SHEBA JAFARI

No (Laughs).

JAKE SIEWERT

Yes, okay, we have to say I didn't, either.

SHEBA JAFARI

I wanted to be an artist, and I guess to some degree I'm drawing lines for a living, right? (Laughs) I started school in film studies. I dropped out of UCLA at the age of 19 to move to Scotland, and I started studying social anthropology there. I eventually started my career in a financial data company as a salesperson. I mean, a glorified call assistant, basically. And the only reason why I really joined that company was purely because I was told that finance pays, and I needed to fund my lifestyle in London.

JAKE SIEWERT

And social anthropology doesn't?

SHEBA JAFARI

Yes. (Laughs) Surprise, right? And honestly, I couldn't relate to anything in the banking world. I didn't understand it; it just didn't make any sense to me.

JAKE SIEWERT

So as an anthropologist, or someone who'd studied anthropology, how did you start thinking about these issues?

SHEBA JAFARI

So what happened was I came across this underground debate forum that was happening at the firm that we were at, and it happened in the basement. And one evening they basically had two people sitting onstage; one of them was basically debating the philosophical standpoint from the view of a fundamental economist, and the other person was debating from the side of a behavioral economist.

And I listened, and it just clicked. I could relate to this, I could understand this. It was the first time that I thought everything that I'd studied up to that point suddenly fit into this environment. So in film school, they actually teach you that there are only a few narratives that exist, so everything, every story, every movie that has existed since Shakespeare to today can fit within those eight to ten narratives.
I don't know if you've ever heard of an anthropologist by the name of Kurt Vonnegut He's also a writer who talks about those narratives as having ups and downs, and that you can graph those stories to reveal the shape of the narrative.

So imagine this: boy meets girl, boy finds love, discovers something wonderful, and then loses it; the chart crashes. There's a period of depression, a trough, and then he makes his way back out of the trough through skepticism and pain and hurt

and gets the girl back and ends up better off from the experience. Does that sound familiar? (Laughs)

JAKE SIEWERT

It does, it does. So what are you most excited about, as you think about the field that you found, and you've ended up in, what are you most excited about in the future? The machines get faster and faster, but some of the fundamentals probably don't change. What are you looking at when you look to the future of technical analysis?

SHEBA JAFARI

So historically, technical analysis has always been an art form. Most of the practitioners have always been discretionary. One thing that we're trying to talk about at Goldman Sachs is we're trying to ask the question of how do we bring science to art? How do we start to make this more quantitative? How do we go beyond just simple back test? How

do we move to work towards building a robust quantitative technical platform?

So one thing we've recently just done is we've hired someone that is going to come onto my team and actually work primarily on building that quantitative platform. And using the resources that we have in machine learning and algos, and I'm just super-excited to be a part of that transition.

JAKE SIEWERT

So because markets are explained in quantitative ways, I think a lot of people think of them as scientific. You used the word 'art' to describe some of what you do. So explain what part's art and what part's science, or how they interrelate.

SHEBA JAFARI

So I mean, the only thing I ever look at is a price chart. And I think a lot of people think that when

they speak to me, that I have these algorithmic formulas in the background. But what I'm really doing is I'm looking at a price line. I'm looking for patterns that have existed in the past, and I'm overlaying the Elliott Wave analogy, which is cycles. Your traditional business cycle with a slight overlay, a slight difference in the fact that it has the ratios, the golden mean ratio.

But that is pretty much it, and it's more of an art form in the fact that you're trying to understand or determine the behavior of markets based on those patterns.

JAKE SIEWERT

So it's interpreting a drawing.

SHEBA JAFARI

Interpreting a drawing. Yes. (Laughs)

JAKE SIEWERT

All right.

JAKE SIEWERT

Cool. To wrap up the episode, let's summarize the central question of the episode. In 30 seconds or less, are markets driven by human behavior?

SHEBA JAFARI

Absolutely yes. The end-user of financial markets will always be you, me, moms, pops, the deli owner down the street, the start-up bro, the guy mining for crypto. There's great parallels here with self-driving cars. Does it matter to you if your Uber is a human or a self-driving car? Probably not. The key here is that the end-user is always going to be human.

JAKE SIEWERT

Sheba, thank you for joining me today.

SHEBA JAFARI

Thank you so much for having me. It's been a

pleasure.

JAKE SIEWERT

That concludes this episode of Exchanges at

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enjoyed the show, we hope you subscribe on

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