

The  
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The Economic Club of New York

114<sup>th</sup> Year  
582<sup>nd</sup> Meeting

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Adena Friedman  
President and Chief Executive Officer  
Nasdaq

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Webinar

Moderator: John C. Williams  
Chairman, The Economic Club of New York  
President and Chief Executive Officer  
Federal Reserve Bank of New York

## Introduction

Good afternoon and welcome everyone. This is Barbara Van Allen, President of the Club, and we will get started in, actually about 45 seconds. Thank you.

## Chairman John C. Williams

Good afternoon and welcome to the 582<sup>nd</sup> meeting of The Economic Club of New York in our 114<sup>th</sup> year. I'm John Williams. I'm the Chair of the Club and President and CEO of the Federal Reserve Bank of New York and I'm honored to be with you all today. And for those of you in the northeast, I hope you're surviving the one to two feet of snow. And I guess we got some bad news on Groundhog Day where it looks like we're going to get six more weeks of wintry conditions.

As many of you know, The Economic Club of New York is the nation's leading nonpartisan forum for discussions on economic, social and political issues. Our mission is as important today as ever as we continue to bring people together as a catalyst for conversation and innovation. I'd like to take a moment to recognize those of our 321 members of the Centennial Society joining us today as their contributions continue to be the financial backbone of support for the Club and help enable us to offer our wonderful diverse programming both now and in the future. I've got a friendly reminder.

Applications for The Economic Club of New York 2021 Class of Fellows – a select

group of rising next-gen business thought leaders is still open. So please visit our website for more details. We'd like to welcome graduate students from Rutgers University and the City University of New York Graduate Center.

Now it's an honor for me to introduce our special guest and Club member today, Adena Friedman. Adena became President and CEO of Nasdaq on January 1 of 2017 and is a member of the Board of Directors. She brings more than 20 years of industry leadership and expertise and is credited with significantly shaping Nasdaq's transformation into a leading global exchange and technology solutions company with operations across six continents.

Prior to being named CEO, Adena served as President and Chief Operating Officer throughout 2016 and was responsible for overseeing all of the company's business segments with a focus on driving efficiency, product development, growth and expansion. She rejoined Nasdaq in 2014, after serving as Chief Financial Officer and Managing Director of The Carlyle Group from 2011 to 2014 where she played a critical role in taking the company public back in 2012.

Before Carlyle, Adena was a key member of Nasdaq's management team and played an instrumental role in Nasdaq's acquisition strategy. And since 2018, Adena – very importantly – has served as a member of the Board of Directors of the Federal Reserve

Bank of New York and now Chair of our Audit and Risk Committee. Last year, Adena was elected to the Board of Directors of FCLT Global, a non-profit organization that researches tools to encourage long-term investing.

She earned her Bachelor of Arts degree in political science from Williams College and a Master of Business Administration from Vanderbilt University's Owen Graduate School of Management.

So today we're going to have a conversation and I'm pleased to be doing the honors. And we'll end promptly at 1:45, and as a reminder, this conversation is on the record as we do have media on the line.

#### Conversation with Adena Friedman

CHAIRMAN JOHN C. WILLIAMS: Okay, with that, Adena, let me switch over to the session, the conversation. So welcome. And, you know, one thing that a lot of people, when they think of Nasdaq, they think about, you know, the dot-com stock exchange. So could you talk a little bit more about what is Nasdaq and we talked a little about technology solutions, and I talked about it in my introduction, so is my view of what Nasdaq is kind of outdated, kind of like my old DVD collection? I should join the 21<sup>st</sup> century.

ADENA FRIEDMAN: You haven't joined Netflix yet? Okay, well, yes, first of all, it's great to be here, John. And it's great to have you have the conversation with me since we do enjoy spending time together on the New York Fed. So Nasdaq today is a global technology company that serves the capital markets around the world. So we, of course, bring our technology to run our, you know, for our own markets and we own and operate one of the largest equities markets in the world. We also own and operate the largest options marketplace in the country, in the U.S. We own and operate many of the markets in the Nordic countries in Europe.

But we also have two other parts of our business that have become a very important part of who we are. So the first is we take the technology that we use to power our own markets and we sell that to 130 other markets around the world, including the surveillance technology where we monitor the trading activities happening in our markets. We provide the technology to 50 other exchanges, 12 regulators, and almost 200 broker-dealers around the world. And then on the data and analytic side, we have about \$350 billion of assets under management tied to our indexes and that can be both our benchmark indexes and our smart beta indexes. And then we have a very scaled data and analytics platform that serves the investment management community.

So we've become, I think, a much bigger and broader player in the global capital markets than what people, you know, than our roots. And, by the way, we launched

Nasdaq 50 years ago next Monday, so we will be 50 years old, as the first electronic market in the U.S., though obviously we've taken that and grown it into a global business.

CHAIRMAN JOHN C. WILLIAMS: Well, I will tell you that working remotely has taught me that when the internet isn't working so well, having those DVDs actually has some value so I do still have some of those. So when we think about the last year and this year, despite the pandemic, despite the recession and everything else going on, I mean the IPO market has been red hot. We've seen record levels of activity and apparently that's continuing into this year. And so how do you think about what's been happening in the IPO segment? Why is there so much activity and can you put that into some historical context?

ADENA FRIEDMAN: Sure, yes. So just to give a few stats, so in 2020, Nasdaq posted 316 IPOs and we raised \$80 billion of capital through the Nasdaq platform. And so we're very proud of that. I think that it was a remarkably busy year. And if you compare that, it's the most IPOs we've had in over ten years. And when you then unpack that, and I know we're going to talk about this a little bit as well, of those 316 IPOs, about 184 of them were operating companies that went public and the remainder were special purpose acquisition companies where they're now looking for operating companies to populate.

So I think that it was a very active year and you can say, well, you know, why would this year of all years be an active capital-raising year? And I think that there are a few elements and I will start with the fact that as we all know, you know, the government did take very important and aggressive action early in the Covid crisis to stabilize the market, make sure that the liquidity is functioning well. And then through fiscal stimulus put more money out into the overall economy which allowed companies to continue to sustain their operations but also allowed individuals to manage their lives, including also thinking about how they're going to manage their savings and getting more involved in the markets.

I think the fact that the, as we know also that with lower interest rates, that it does become more attractive to raise capital through the equities markets. It also, as an investor, it kind of concentrates investment activity into the equities markets because the alternatives become, you know, less earnings-generating or investment-generating. So we have more of a concentration of interest in the equities markets.

And then for companies that were either unaffected by the Covid crisis such as technology companies, a lot of biotech companies, some companies are actually leaning in and providing services to manage people through the crisis, they all found actually a very receptive investor audience for those investments. And those were the first that started coming in late April and into May. And then honestly, then the risk

appetite just became very active among investors and then, you know, we ended up having a very robust second half of the year.

CHAIRMAN JOHN C. WILLIAMS: Yes, you mentioned the SPACs. So can you talk a little bit more about that? I think for most people, it's not clear what those are and why they've grown so rapidly and, you know, this idea of a blank check company is relatively new. So could you talk more about what that is and why that's become such a big part of this world now?

ADENA FRIEDMAN: Yes. Well, first of all, these SPACs, which is special purpose acquisition companies, they've actually been around for a fairly long time but they've obviously had this big resurgence in 2020 and into 2021 as well. So, so far this year we've also had a very active IPO year. So what are they? So basically a qualified management team, essentially an expert in a particular field or an industry, will get together with investors who go out and they raise capital into a corporate vehicle that does not have any assets.

So it's just putting, it's like a fundraising opportunity. So they use the capital markets, you know, the public markets to raise capital. And then within 12 to 24 months they're obligated to populate that company with an operating business. And so think about it as really the operating business being acquired by the SPAC as a way to get into the



public markets without a traditional IPO.

So why would a company want to go public that way? I think, you know, all the reasons I've heard are, number one, it can actually be faster. Acquisitions are not easy but they can be done faster. The second is that you get, for the selling investors in that private company, you get certainty of price. So, you know, the one unknown that you have when you walk into the public markets through an IPO is what's the price going to be and what proceeds am I going to get? Well, that takes that uncertainty away.

And then I think that the third thing is then you also get, you know, a qualified group of investors or managers who can help you as a public company make your way into the public markets and act as a public company through the management of the SPAC. So I think those are reasons why companies are finding it to be more attractive.

As an investor you'd say, well, why would you park your money in a SPAC and hope that they find a good business? Well, it's a good question, but if you think about it, number one, there are not a lot of other alternatives that will give you a chance for a return now. Right? So that's the first thing. The second thing is that the investors do have a chance to vote on the deal. So, number one, you know the SPAC itself is liquid so if they decide they need their money, they can actually sell their shares in the SPAC before it's populated and get the money out. Then when the deal is announced, they get

to vote on that deal. So if they don't like the deal, they can either sell their shares in the SPAC or vote against the deal. So the investors have a fair amount of control to make sure that they are managing their money really through the SPAC. And so I think that's why it's become so popular.

CHAIRMAN JOHN C. WILLIAMS: Thank you. That was very helpful background. But, you know, one of the things that I think about is when things change really quickly and something like this grows really rapidly and you hear, I think, every day somebody else saying that they're going to, you know, somebody's going to start a new SPAC, it does remind me a little bit – I'm not coming to any conclusions, but it does remind me a little bit of the go-go days of the late 90s where things were moving really fast and markets were growing really rapidly. And given, you know, your career, you've seen cycles in Nasdaq over your career, how do you compare these different episodes? How do you think about that?

ADENA FRIEDMAN: Yes, I think it's important that investors always keep everything into context and they think about diversification as a general, as part of their strategy I would have to say. So, you know, I was at Nasdaq in the late 90s and so I do remember that time very vividly. And I think that at that point there were a lot fewer protections on investors. For instance, I think Reg FD had just come into effect very late in the 90s or even in the early 2000s. So I think that there were certain investor protections that didn't

exist back then. I think the second thing was that, as you said, it was the promise of the future, but the actual reality of the companies, you know, just didn't, weren't there yet.

So here the companies that are going public, operating companies going public are in many regards very good operating companies with solid financials. Now, you know, the great thing about the public markets is you can invest in highly risky stocks or frankly in not very risk stocks. So you can choose your risk tolerance within the markets. I think that the disclosure obligations are very, very robust in the public markets so investors have a full set of information.

But when it comes to the SPACs, I think that the important thing to think about is how are investors protected? They're protected in multiple ways. Number one, they put their money into this shell and they can always sell if they need their money out before they populate. Number two, there's a defined period of time, by the time, you know, the management team has defined and populated the SPAC or else the SPAC expires. Number three, the investors get to vote on the company and what company they're bringing into the SPAC and so they have more control over that.

And then also if you look at the, one of the things that investors should look at is how does the management team get compensated. And increasingly, they're getting compensated on the performance of the operating company which I think is also very

helpful. So there are a lot of protections that are being put in place, but it is also important that investors educate themselves on what these vehicles are and what they aren't and make sure they're comfortable with them.

CHAIRMAN JOHN C. WILLIAMS: So we're going to come back to the market developments a little later, but you said that, you know, Nasdaq is fundamentally a technology company and you're operating throughout the world. So can you talk, let's just talk a little bit about how technology is changing, you know, in terms of innovation and how that was accelerated around the pandemic time.

ADENA FRIEDMAN: Sure. Well, if you think about the role of exchanges today, and actually always, it has been to maximize access and minimize friction. So our job is to make it so buyers and sellers can come together as efficiently as possible and that we maximize the number of buyers and sellers that are available in the market. So that's a big part of what we do.

Well, you know, historically that was all done through physical means and by putting people in the same room and kind of creating a crowd. Well, I think today it's all done technologically. And so the engineering challenges that we face as a company today are fundamentally different than they were back in the 90s. You know we're dealing with up to 62 or more billion messages in a given day being received through our

technology. We have to provide, you know, I would say low microsecond latency so we tend to try to go for sub-30 microsecond latency from when we receive an order to when an execution is sent back to the client.

And we also have to scale ourselves. So we might have these surges in activity like we did last week or in March of last year, we have to be able to just, you know, be able to absorb enormous amounts of activity that are coming in. So the engineering challenges are fascinating, honestly, they are just, you know, they're constant, they're changing.

And so then you also say, well, what technology is coming that could make those engineering challenges, solve those engineering challenges? And you do start to look at the Cloud, you know, what is the Cloud meant for is to create, like almost infinite scalability. Where the Cloud has not yet kind of gotten to a perfect place is on dealing with it in an ultra, ultra-low latency environment, but it's moving along that spectrum so that getting to an ultra-low latency but also, you know, just infinitely scalable environment is becoming possible.

So that then is, that's a big part of our journey to advance our technology into the Cloud as a market operator. Most of our surrounding systems and other services are Cloud-based today. And then I think also machine learning, so machine learning is a phenomenon that is just getting started. And if you think about the theory of efficient

markets, if everyone has the ability to come up with infinite number of, you know, especially with quantum or something like that where you have an infinite number of circumstances and you can kind of model them down and find the best path in the market at any given time, you know, through machine learning algorithms, you have the ability to create perfectly efficient markets theoretically.

But those are the types of things we think about. And in the early days of machine learning, we're using them more around the protection of our markets and getting, being smarter in our alerts.

CHAIRMAN JOHN C. WILLIAMS: Yes, you know, on this topic that you just mentioned, you know, the extraordinary amount of trading, the volatility of the markets last March and then more recently, so when you think about all the remote, the working remotely, all the things that have happened, what's been your biggest surprise about, or kind of takeaway from how this technology has worked, how people have been able to function in this unusual environment?

ADENA FRIEDMAN: I mean certainly within the financial industry, John, I think we talked about this a while ago, if you think about after 9/11 and you think about during Superstorm Sandy, the markets had to close. And frankly around 9/11 it wasn't because Nasdaq's systems were unavailable, but no one could connect. And if people can get

into the offices, they couldn't get to their trading screens and they couldn't trade. And so I think that the reliance on physical location has created challenges for us in two big seminal moments in recent history within the industry.

And so on the back of, particularly Superstorm Sandy, the entire industry undertook an effort to move everything to a remote environment, right? So we started doing a lot more business continuity planning on taking our entire market ops team and running them out of their house, you know, taking all of tech ops and being able to run everything remotely in a remote environment, taking an entire office location and saying go work from home for a week. And so we, and the entire industry really undertook a huge effort.

So when March hit and we all, I mean it was within one week you could see almost all of New York moving to a remote environment, everyone was ready. Like it was so much more seamless than you would have expected it to be. So that was my biggest surprise but in a pleasant way. Now it doesn't mean everything functioned perfectly, but it really was much, it was really a remarkable achievement for the industry to do that because it was so important that we keep markets open, operating and safe, and I think that the industry should be proud of itself for that.

CHAIRMAN JOHN C. WILLIAMS: You know the term we talk about a lot at the bank, as

you know, is resiliency and this idea of being able to function in any circumstances. Taking the experience of 9/11, from Superstorm Sandy and other experience and applying that, it ends up being applied to the thing that probably you or we weren't planning on, the global pandemic, and yet that preparation obviously has paid off. I do think, though, right now that we have learned also how productive we can be when you work 12 and 14 hours every single day, which is another topic.

So let me, again on this issue of, you know, kind of the markets, one of the things that Nasdaq announced is it would acquire Verafin, a firm that specializes in anti-financial crime solutions. So could you talk a bit about why you've done that and how you think about that fitting into your overall market and your strategy?

ADENA FRIEDMAN: Yes, I think a bit part of who we've always been and who we are has been really to protect the integrity of the capital markets. That's a big part, a big role that we play as an obligatory organization, and it's a big role we play as a technology provider. And a little over 10 years ago we bought a very small company called SMARTS, which has grown into being one of our larger businesses within our tech division, which provides advance surveillance technology to help markets and regulators and now the broker-dealer community, protect themselves and think through, you know, making sure that they understand what's happening in their trading desk or in their markets around compliance with any of trading rules, market manipulation, insider



trading, things that would harm the integrity of the markets and we need to make sure we're properly protecting the industry in that way. So we've been, we've become a very scaled and successful technology provider of these market integrity solutions.

So as we think about how do we want to go forward and continue to expand Nasdaq and the reach we have within the financial community, it's very natural for us to want to expand beyond the real-time surveillance and into the broader realm of anti-financial crime, like anti-money laundering, and fraud detection and protection.

So we have gone into an agreement to buy a company called Verafin. They provide anti-, you know, basically anti-money laundering and fraud detection services to 2,000 banks in North America. And we have an opportunity to bring them into the larger banks and then to go global with their business through our global footprint. And so we're really, really excited about that, and also recognizing that anti-money laundering and market manipulation and other things like that, they're starting to, the banks are starting to figure out how do they want to tie those protection capabilities together and integrate those solutions. And so we think we can be part of that solution for them going forward as we continue to integrate the Verafin and surveillance systems that we have.

CHAIRMAN JOHN C. WILLIAMS: And again this is presumably an area where all these new technologies we hear about play an important role in that. I know that in our

discussions, from my position around the world, around fin-techs and using machine learning and all these other technologies, that's a big part of the story of leveraging those technologies.

So I'm going to shift gears again and talk about the board diversity initiative. Late last year you announced the proposal on board diversity for public companies. So I'd like to hear you kind of talk a little bit more about that decision. What's the timeline on that? Where does it stand? And what kind of reaction have you heard on that proposal?

ADENA FRIEDMAN: Sure. Yes, so first to level-set everyone on what the proposal is, it has two components. The first is to create a standard disclosure on the diversity of company, you know, public company boards. So any company that lists on Nasdaq would be required to provide a table every year that provides the diversity characteristics of their board based on self-reported information from the board members. So that disclosure and that transparency to investors is something the investors have asked for, for many years, and we think it will help in identifying trends and can definitely, you know, cause a movement towards more diversity in the boardroom.

The second is a standard that we've asked our companies to try to meet, which is to have at least two diverse members in the board and that would be at least one woman

and an under-represented minority on their board and that's over the next four years. But the obligation, you know, the standard does not require that they achieve that but rather that if they're not able to achieve that standard, that they then discuss with their investors why they haven't been able to get there and what they're doing to the extent that they want to share that information. So it's really what we call a "have or explain rule." So you don't get de-listed if you don't meet the standard but you do have to share information with your investors as to why you're not able to meet the standard.

So in terms of the reaction, so the first thing is on process. It's a proposal that's been sent to the SEC. The SEC put it out for public comment. We've received well over a hundred comments and it's been wonderful to read the comments. They're very substantive. I would characterize about 73 or 74% of the comments have been positive and many of them coming from the investment community, the companies themselves, and advocacy groups. About, maybe a little over 20% are what we would say as negative and they tend to either come from individuals or advocacy groups that have concerns and it's good to hear what those concerns are. And then the remainder have been mixed. You know, they might like it but they want to see changes to it.

So it's great, it's a great process because we get to learn. We will then respond to those comments. Potentially, if we want to, we can make some changes to the proposal. And then, to the extent we do make changes, it would go out for comment again. So this is a well-known process because once the rule is in place, this is a self-regulatory

organization, it is applied to all companies that list on Nasdaq. And I'd say that the, you know, there are a lot of positives that we've heard from our clients and from the community, but I also think it's important to recognize it's change. And so we have to make sure we're hearing all voices as we think about implementing change.

CHAIRMAN JOHN C. WILLIAMS: Have other exchanges done things like this elsewhere? I actually don't know kind of what's happened with the others. Or is this something you've coordinated or...

ADENA FRIEDMAN: Yes, well generally speaking around the world, it's been governments who have taken the stand on board diversity. So in Norway, they were one of the first, about ten years ago. They established a standard that at least 40% of every board should be comprised of women. And so that was a hard mandate and it was, you know, very controversial at the time. I think that they could certainly point to things that it's accomplished in the ten years since.

I think other countries have done more of a have-or-explain type of model and I think that they've also been effective. So we've been able to see that in other Nordic countries. And then actually in other parts of the world, including the Middle East, they're starting to have mandates be put on board diversity, but it's all been done at the governmental level. I think we are the first exchange to choose to do this as part of our

listing rules.

CHAIRMAN JOHN C. WILLIAMS: You said the timeline is you're collecting, continuing to collect comments and then you have to go out for a second round, is that what you had said?

ADENA FRIEDMAN: So, yes, it depends if we choose to make any amendments, then the SEC would likely put it out for another comment period. I think that it's, there is a defined process within the SEC, excuse me, timing, on when the SEC has to make decisions on certain proposals. But this will happen in a period of months, not weeks, just based on the SEC process.

CHAIRMAN JOHN C. WILLIAMS: So coming back to kind of more recent events, you know, markets have been in the news a lot. Some companies that I didn't think people would be talking about like Blackberry are in the headlines every day. So can you give your, kind of from your vantage point, having watched markets over decades and importantly seeing the technological change. You mentioned that Nasdaq started almost 50 years ago and there's been a lot of technological change. But we're now seeing that in terms of, you know, other platforms. So could you comment at least from your perspective how you view the developments we've seen in the markets in the last few weeks?

ADENA FRIEDMAN: Sure, yes. I think it's good to put it into some context. Nasdaq, the entire purpose of Nasdaq has been and will always be to democratize access to the market. So, you know, and I came into Nasdaq in 1993 so right as the retail internet brokerage community was getting launched. And it was amazing honestly, how it empowered investors to access the markets and to have more control over their own savings. And I think that really gave rise to a whole new way of thinking about the markets and access. So we've always been huge advocates of that and including the current modern retail online brokers, you know they're an important part of the ecosystem and they provide access to hundreds of millions of people and to the markets which we see as a good thing.

I think that another part of our role is, of course, to maintain the integrity of the markets and to make sure that they're fair and balanced and making sure that every investor gets access to information about a company at the same time. You know that's a big part of our authority as a listing market is to work with companies around reporting news and managing activities in their stock, but our primary purpose is to allow buyers and sellers to come together. And, you know, there are going to be periods where there are more buyers than sellers and there are periods where there are more sellers than buyers and our job is to allow for liquid access. That's our job. And so we take it very seriously.

In this particular case, they had a phenomenon that a lot of us didn't understand right away because it was happening very quickly where there were, you know, retail-oriented chat rooms that were starting to galvanize investors to go and buy, you know, a certain company. And generally speaking what I would say is, you know, companies that had had a fair amount of short positions in them. So, you know, professional investors were generally showing that they were betting against the companies with short positions, these retail investors kind of came together and said let's become buyers. And so they basically crowded their capital together to buy the stocks and they created this giant one-sided trade. And so that has consequences.

So the first thing is we just all have to understand what's the nature of that activity and I think the SEC in particular will be looking at that and examining, is that activity just a spontaneous group of unconnected people? Or is there some sort of coordinated or concerted effort in that kind of activity? That's something that they'll look at. And the second thing is to make sure that the brokers have enough capital to manage these positions that they're taking on in their systems.

So the brokers are members, or they use members of clearinghouses. And the clearinghouse in the U.S. is DTCC. So when you take a huge, long position and you've got a crowd-source long position in stock and the stock becomes very volatile, that changes the capital requirements that the clearinghouses place on those brokers

because the trade doesn't settle for two days. So that two-day risk becomes pretty big if it's a highly volatile stock and you've got a really long net position.

So, you know, the online retail brokers were facing a situation where they had to potentially limit access to their investors to allow them to continue to buy and increase that position or they had to put up, and/or they had to put up more capital. And so you could see where they, in some cases, had to restrict some access while they raised the capital to be able to meet the capital obligations that DTCC was establishing. That is just how the markets work to create safety and resilience and risk management but it's a part of the market that people don't understand very well. So I think that generally you've seen them put up the capital. They've made their trading available. And the investors are expressing themselves how they wish. But the one thing I would just say is, you know, there are rules that govern our markets and people will be examining the behaviors to make sure that everyone is following the rules in the process of doing these trades.

CHAIRMAN JOHN C. WILLIAMS: Well, it's another example of how, you know, technology has transformed, you know, how information is transmitted. The people, going back to, you know, the news, people are not perhaps reading newspapers and watching the 6 o'clock news as much. They're getting it through social media or other online sources. Similarly here, I think the surprise may be just how much that



information is flowing through, you know, maybe you could think of this as non-traditional ways, but perhaps they're going to be more traditional ways of how people act and communicate.

ADENA FRIEDMAN: Yes, and I think the issue is that there are, you know, one of the things, since I've been in the markets as long as I have, you know, we've seen a lot of different behaviors. But way in the 90s, you know, a long time ago, we would see concerted efforts by brokers to try to drive investors into stocks. The brokers would take a position early, they'd drive up a stock, they'd sell the position, and they'd leave the investors hanging. That has, you know I think about that and I want to make sure that all investors just understand and are fully informed on the risks they're taking, but also on making sure that they think about this as their savings. So as they're putting their savings to work in the markets, you know, are they understanding the risks that might come in. But those are, you know, old memories.

The question is, is that really what's happening here or is it really just truly a spontaneous group of investors deciding to stand up and take a position? And I think that's something that we'll learn more about over time. But in the meantime, I think it's great that we give access to hundreds of millions of people. I think it's important that every investor educate themselves on how best to leverage the markets.

CHAIRMAN JOHN C. WILLIAMS: So going back to how technology has transformed, whether it's in stock exchanges or financial markets or other areas, what do you see as the biggest kind of new technologies, the way technology is going to transform, whether it's your business directly or more generally? What is the next big thing?

ADENA FRIEDMAN: Well, I think the thing that everyone likes to point to because it's so fun to think about is quantum computing and it is actually important to think about. You know, I do think that the notion of a quantum computer, the power of a quantum computer, is becoming a reality. And you could look at, you know, you've seen these experiments that Google and others have done to show and prove out the notion of this, what I'll call hyper-powerful computing capability.

When that becomes a mainstream of the economy and the markets is another question that I don't think any of us can answer right now. But we do think about it because when we think about our job, which is to protect the markets and maintain the integrity of the markets and we provide advanced technology to do that, that incorporates machine learning into it to help manage the risk that people are taking on in the markets, I think it takes it to a totally different level when you think about quantum computing.

So staying ahead of that trend, being engaged with those companies that are on the forefront of that technology is an important role that we play to make sure that we can

be an early adopter and bring that into the industry from a protection perspective. And obviously also from a computer power perspective and making sure we can continue to scale the capabilities of the markets to accommodate that type of technology.

I think the other thing that people really focus on is the security, IT security elements that might be challenged with a quantum environment and making sure we're upping, you know, the whole IT security industry is upping their game to prepare for that type of technology coming in. And that then goes to the digital certificates and digital asset world where the security of those, that type of code, the question is, is it going to be protected enough when you think about the power of quantum to be able to basically break codes and basically infiltrate systems and infiltrate software? So I think that that's the one that we all should be really starting to have a concerted conversation around to understand how it could impact markets going forward, but it could be 20 years before that hits the mainstream, you never know.

CHAIRMAN JOHN C. WILLIAMS: So you said that you're about to have your 50<sup>th</sup> anniversary for Nasdaq, is that right?

ADENA FRIEDMAN: Yes, next Monday.

CHAIRMAN JOHN C. WILLIAMS: All right, okay, well, congratulations. So when you

think about the changes that have happened with Nasdaq, we've talked about them, you know, starting electronic exchange, being a technology company, I mean if you were to jump 50 years ahead, I mean what do you think the next 50 years are going to be like? I think you've already talked about that with quantum computing.

ADENA FRIEDMAN: I should probably make sure I think about that answer. That'll be a common question. I mean what's been fun to see over the last, I mean over the last 50 years would we ever have pictured the level of technology and how it's influenced our lives and, you know, the ease in which we get access to information and the ease in which we communicate and the size and scale of the markets and how big and broad they are today. I'm not sure in 1971 anyone could have predicted that.

But what I do think that we can be sure of is that I believe that the markets do serve as a critical center. There is a natural reason why markets exist. Because there was an inefficiency that if you decentralized the markets, then you would have – what I would call kind of a time issue between the buyer and the seller. Buyers and sellers, they want to find each other, but they may not want to find each other at the exact same moment. So markets provide that critical role of that instantaneous access to liquidity in an environment that is as fair as possible. So I think they'll persist, so that's the first thing. Markets will still be here in 50 years.

I think the second thing is it's a global world out there and the question is over the next 50 years, do we find barriers breaking down where more and more trading can be done. Trading is done globally, but I would say markets continue to be very domestic. And so is there more of a, at least a technology fabric that ties markets together? I think the Cloud is a big part of that. But I also think that, you know, changes in the way that the world thinks about itself, the global economy versus national economies, in the next 50 years, if the economy really were to become a global economy, that gives rise to a whole new range of things that exchanges could do together. So those are the types of things I think about over the next 50 years.

CHAIRMAN JOHN C. WILLIAMS: Terrific. And, you know, you will not be surprised to hear that economists, when we write in our models, we just write a sentence that says, assume there exists markets, clear all prices, well, clear all markets and settle prices in equilibrium, and then move on. So that's how we...

ADENA FRIEDMAN: ...an underlying economic assumption, I like that. That's good.

CHAIRMAN JOHN C. WILLIAMS: Assume a can opener. So, last question. I asked you about 50 years ahead and thinking about that. What about 2021? You know, 2020 was an eventful year. What keeps you up at night? Now it's February 2, 2021.

ADENA FRIEDMAN: I would say every week it's felt like a month this year so far. But I think that it's a very fast-moving environment right now so I think making sure that we are meeting the needs of the market, that we continue to be as resilient as we have been. Those are the table stakes and those are things we focus on each and every day. I think as I think about the broader picture and just making sure that the vaccine rollout is smooth and effective and successful because it's the only way that we're really going to find ourselves comfortable getting back together and starting to have the spontaneity of in-person conversations and having the creativity that comes with that.

And frankly, having the economy come back to life and allow ourselves to have experiences again and to be global. You know we can't even travel so we can't even see or go places. And I think that's a big part of gaining understanding and being a global citizen. So I'm excited for that, but I think what keeps me up at night is just making sure it actually proceeds the way it should so that we can get back to whatever normal is going to look like.

CHAIRMAN JOHN C. WILLIAMS: Yes, well, I agree with you. We're all looking forward to complete, successful vaccination and being able to get back to normal. Well, see, my job is to make sure we run on time. I see that we are right now out of time. Adena, thank you so much for giving us the look-back 50 years, what's happened in the last week, and then the look-ahead to the next 50 years for Nasdaq. This has been a terrific

conversation. Thank you so much for joining us today.

ADENA FRIEDMAN: Thank you.

CHAIRMAN JOHN C. WILLIAMS: Well, I'm going to close now with what I always close with, that we've got a whole bunch of speakers lined up. In 2020, we had a record number of events at the Club and it looks like we're trying to break that record in the first half of the year the way it's lining up.

So let me just give you a couple or several that are coming up soon. So on February 10, we have Jay Powell, the Chair of the Federal Reserve System of course, speaking at the Club. And then we've got, on February 12, Peter Orszag, Bob Rubin and Joe Stiglitz will be at the Club. Then on February 17, we have Marc Tessier-Lavigne, President of Stanford University. And then on March 2, we've got Mary Daly, President and CEO of the Federal Reserve Bank of San Francisco. And then looking further ahead, we've got, on March 11, we have Citi CEO, Jane Fraser, and GM CEO, Mary Barra, joining us for a conversation. And we're working hard on those 12-hour days to lining up more and more events for you. So please keep tuned to your emails that we send out and watch our website for more announcements. So, everybody, thanks again for attending today's event. Please stay healthy and safe.