An Evening of Discussion on Fintech and the Financial Services Industry: **Disruption, Destruction, or Collaboration?**

Technology has facilitated the ability of Financial Services companies to process greater transaction volumes, develop new products and services, analyze and synthesize enormous amounts of data, and manage, while at the same time create, new and more challenging risks. Increasing regulation is driving market changes and generating opportunities for new entrants. Innovative, technology-based firms are aiming to disintermediate traditional Financial Services providers who have recently been challenged with growing regulatory constraints.

November 9, 2016

LET'S BEGIN WITH ACKNOWLEDGING LAST NIGHT'S EVENTS [ELECTION DAY]. WE HAVE A NEW PRESIDENT AND NEW CONGRESS – WHAT ARE YOUR THOUGHTS ABOUT WHAT THIS MEANS FOR THE INDUSTRY?

Jane Gladstone (JG): It's hard to be specific since we still don't know that much about the detail on policy of our new president, and of course he's going to have to work with the House and Senate to pass anything, so I would just say these high-level remarks: today the market obviously gave a resounding vote that the financial services industry is better off. We saw an enormous rally today in financial services stocks, which were up almost across the board. And I personally, and this is not a policy statement, this is a view about long-term trends in financial services, I personally think it was overdone because some of the structural challenges that the financial services companies are facing will not be undone, even if Trump stays true to his word that he wants to get rid of, for example, Dodd-Frank. So, I think the rally was overdone and a big piece of it was the view that Dodd-Frank was going away and that rates will go up considerably more under Trump, and I don't think, even if that is true, I don't think that'll be enough to justify his really significant values.

Vijay Mayadas (VM): Well for me, being both a U.K. and U.S. citizen, it's certainly been an eventful year. Trump has made a lot of noise, to Jane's point, about repealing Dodd-Frank and cutting back on regulation and his campaign has kind of bounced back and forth between whether to reinstate Glass-Steagall or not, so that's still going to be an open question. It does seem that he's quite warm to smaller banks and there's a political warmth around smaller banks, so maybe there's a bit of a recognition that the regulatory and compliance costs for them are a bit too high. There could be some moves made, potentially in that area, but you know we are in the very early days so really we'll just have to wait and see.

Vincenzo La Ruffa (VL): Scaramucci is already out repealing DOL and I think with that you're going to have a lot of partial bills. I don't think you're going to see wholesale repealing of things, but I think you're going to see DOL carved back. I think you're going to see the CFPB's power pulled back, despite every protectionist law the Obama Administration has put in. I think you're going to see bits and pieces around Dodd-Frank changed. But look, he's only the president; he needs the government and the Senate. He's going to have to work with a Congress that's somewhat on his side depending on the issue. I don't think these things are going to happen overnight. I think these things will trickle out and we will have to see how it goes.

Jim Toffey (JT): I just tend to think that the banks and the trends that are in place are going to continue overall. That, as a broad theme, banks are going to still have to do more with less. They're going to have to be smarter and they are going to have to figure out where their competitive edge is - Where do they want to be the best? What areas do they view as outsourcing opportunities and barriers where there is no distinctive competitive edge? - and continue to make those tradeoffs.

LET'S TURN TO THE INDUSTRY, FINANCIAL TECHNOLOGY COMPANIES ARE A TWO-EDGED SWORD FOR THE INDUSTRY. THEY CAN SOLVE THE PERFORMANCE PROBLEMS OF THE BANKS OR SPEED THE DECLINE OF THE BANKS. WHAT DO YOU THINK? IS FINTECH AN ENABLER OR A DISABLER?

JG: I personally think they're both. I think the banks that work with fintech are enablers and there are lots of good examples of this. I don't mean just banks, but traditional financial service organizations have a lot of opportunity to take the advantages that they have in terms of an established customer base and balance sheet and the like, and combine that with the innovation and technology of some of these innovators. There are lots of good examples of those partnerships. One that we worked on this year is Personal Capital working with Power Financial to bring digital wealth management to Canada. This is one good example, but there is a very long list of that type of work within the industry.

"Fintech companies have many advantages over financial services companies … and are a force for disruption as much as enablement."

-Jane Gladstone

But of course, there are also disruptors and there are many structural advantages that, regardless of any policies that I can imagine being implemented, will remain the case. Fintech companies have many advantages over traditional financial service companies - even the largest ones - and are a force for disruption as much as enablement.

VL: I agree with that. I think it varies sector by sector. Do I think that there are going to be any new entrants in the capital markets world? I think that's hard to create. The electronic broker dealers that we have that are independent aren't doing particularly well, so I think it's very likely you're going to see collaborators not disruptors. In the insurance space, I think you're going to see almost entirely successful collaborators and not disruptors. That's an industry that is too hard, too capital intensive, too regulatory intensive. Payment, interestingly enough if you take a look at the big providers today, they were the growth companies 10 years ago. We are sort of way

past that cycle. There probably will be other new and constant kinds of disruption that are less regulatory driven. Asset management, I think, is slightly less clear, slightly murkier. I'm still a little skeptical of the disruptors, by and large represented by robo-advisors. Right now, maybe I'm a little less skeptical of their ability to get to a sustainable purge and not have that service adopted by the incumbent. But if disruptors are going to have a place in this industry, I think that will be in asset management.

JT: I agree with Jane; it could be both. It's really up to the bank though in terms of whether they want to play offense or defense as these technology waves advance. So, in my experience, building kind of a project marketplace for institutional investors, I saw banks embrace it right away and use it as a way to gain market share, to move forward. I also saw other banks saying, "I hope this doesn't happen before I retire" and kind of watch the clock and then eventually have to embrace it. I do think the internet is here to stay and marketplaces as we think about them will continue to evolve and change. Who would've thought three years ago or five years ago Airbnb would be a market place to rent out your condo or your apartment, or Uber would be a market place for people to drive around offering rides. So, it's going to continue to evolve but I do think the banks definitely have a critical role and the ones that want to play, and play offense with it, will actually gain market share and others will not embrace it.

JG: Maybe I should just give an example of what I mean when I say there's an aspect by which fintech comes to enable and then there's a disruptive aspect. I think the prop trail of electronic prop trading industry is a really good example. I don't think that big banks are ever going to play the role in market making going forward that they did in the past. Even if they throw Dodd-Frank out the window, Basel isn't going away and even if Basel went away, which I don't think it is, the ability to attract the data scientists and the software developers that you need to do effective electronic trading is never going to sit in the banks. So, when you look at the double and triple digit ROEs and electronic prop trading firms and compare those to the single digit ROEs at banks, those aren't going to converge in any view of policy that are rational or culture that a rational person can have. But, the smart banks get it and are saying, "We still have clients who value their relationships they have with us. They value the research they're getting from us. They value the connectivity they have with us, so we're going to partner with X, Y, or Z prop trading firms to get the liquidity we need to serve our clients and keep those relationships with our clients." And so, those [prop trading] firms have become really important sources of liquidity. That's an important enabler function that those electronic prop trading firms are serving, but that's different than saying that the firm is going to make XYZ bank an important market maker in and of themselves.

HOW ABOUT FROM A FIXED INCOME PERSPECTIVE?

VM: I'm actually going to turn Vincenzo's point around, I think there's a real distinction between consumer fintech and institutional fintech. In the consumer fintech world, you can create a value proposition, which really is a step change, directly to the consumer. And if you can do that right, and you can get it to be successful in the margin, you can really scale that business and ultimately become a very credible disruptive threat to an incumbent - I think PayPal is a great example of that. In the Capital Markets space, there are a lot of differences and you have complexity in the processes and in regulation and things are reasonably efficient today. In cash securities, we have trillions of dollars of bond value flying around the system every day and it's really hard to kind of drive greater efficiency in those kinds of processes, and it's not really because of technology that we can't settle more quickly, it's more because of regulatory behavioral changes. So, I think when it comes to disrupting institutional fintech, I think the opportunity is less about disrupting the business models of the incumbent but more about an opportunity to disrupt things like costs that could really help the incumbents change the way they run their processes internally and re-engineer inefficient processes. There are going to be

opportunities on the side to create more liquidity in certain assets at an institutional scale. But I think the primary opportunity in the Capital Markets world is more around the engineering of existing workflows using new technologies and investing in a lot of companies who can do that.

JT: Jumping on that theme for a second, at LiquidX we're dealing with the non-CUSIP world of loans and receivables, payables, and more bilateral types of transactions. We see a lot of banks saying, "Okay I have to do more with less, let me outsource or partner with you (fintech company) on either distribution or origination so that I can keep my costs down, my ROE up, and do those types of things." So, when it's in the front office or the back office you see banks, the smart ones at least, always looking at these kinds of opportunities and saying, "How can I leverage them?"

DO THEY DO THAT ON A PRIVATE LABEL BASIS OR DO THEY DO THAT WITH YOUR NAME THERE? OR YOU'RE BEHIND THE SCENES AND EXECUTING UNDER THEIR NAME?

JT: Think of it like Amazon where you have sellers coming on to Amazon and leveraging the Amazon network, the whole network, the legal, the delivery and everything else, but selling their goods on the platform with one legal framework. That's an example of how they're doing it. We're actually going with banks, hand-in-hand, to some of their clients to say, "Together we can offer you a service that we can't as a bank alone offer individually."

WHAT'S THE NEXT THING THAT BANKS ARE GOING TO DO TO HOLLOW OUT THEIR CAPITAL MARKETS BUSINESSES, REDUCING BALANCE SHEETS, AND REDUCING THE COST OF THE FLOOR ITSELF?

JT: Well I just think they're looking for ways that explain, "How do we do more with less? What is my distinctive competitive advantage? Where are my relationships? Where can I leverage technologies? Is it better for me to build my own single dealer or single bank platform? Or is it better to leverage a network back and customize what I'm trying to achieve for the customer?"

YOU UNDERSTAND HOW FINTECH WOULD WORK WITH LIQUID MARKETS, RIGHT? YOUR FIRM IS ACTUALLY GOING AFTER PRETTY LIQUID THINGS. JIM, MAYBE YOU COULD TELL THE STORY?

JT: At a high level, I think that the parallels that we see in our everyday life are replicated in the institutional financial markets. Just like Amazon started with books and then went across the spectrum to everything, and now we see Uber and Airbnb going into spaces that you wouldn't think of are liquid market places, the same thing is happening in fintech where you've started with the stocks and bonds and foreign exchange and now you're moving into illiquid assets and illiquid market places, or market places where illiquid assets are now giving birth and trade receivables were never traded - no pun intended. But in the non-CUSIP world, if you think about what banks have to do today, there's really the investment bank and the commercial bank. And really most of what the focus today has been on in the fintech world is the investment bank - whether it's the front office or the back office and how to make those market places better, streamline them, and take the costs out to create more efficiencies. I think the same thing is going to happen on the commercial bank side where, whether it's origination, or distribution of assets in the front office, or streamlining your back office processes, there's a lot of costs, there's a lot of efficiencies that can be taken out. Blockchain will be an enabler of that and other things to come along, so I think there's a whole other wave that's going to hit that side of the business.

IN THE ILLIQUID PORTIONS OF THE MARKET, HOW DO YOU MANAGE, HOW DO YOU GET THE TRADES DONE?

JT: Well, it's the exact opposite of what Jane was talking about, which is algo-trading, because you're dealing with illiquid assets, so it's a very small, slow protocol which is basically options-based. If you think about illiquid assets and you want to buy or

sell them, what do you think about? Art auctions or real estate auctions. With financial assets, when you want to create liquidity around them, you take the same protocol and you use them there. But it goes well beyond that because there's a whole legal framework. Just to do a bilateral transaction on one of these illiquid assets, if you just want to set it up, would cost $50,000 for the customer to put in place an agreement before they actually did the transaction. Well, the market place where I join and sign one contract to have the benefit of trading with everybody on that platform with one group agreement would cost me $25,000. Think of the costs that have just been taken out just from legal compliance side by having one standard agreement that everybody signed up to on a marketplace. So, that's just an example of the benefits going forward.

THIS IS THE NON-CUSIP SIDE, AND CAN THAT FLIP INTO CORPORATES?

JT: Sure, and there's already been platforms out there in corporate bonds. There's reasonable traction there. I think there's room for more in the corporate bonds space. But certainly, there's been progress there and they're will be more progress, and I think that's what it all comes back to: how do you leverage technology to be smarter, to do more with less, and still keep your edge? Because you have to have a reason to get up every day. You have to have a reason to serve your customers. And what do you do is proprietary vs. what do you do that can be outsourced and leveraged to expand your relationships - and that's what I think everybody has to think about.

"…What it all comes back to: how do you leverage technology to be smarter, to do more with less, and still keep your edge?"

\- **Jim Toffey**

LET'S PUT ON YOUR 5-YEAR FORECAST HAT. THE VOLCKER RULE HAS KILLED THE MODEL OF FREE LIQUIDITY IN EXCHANGE FOR FLOW. SO, WITH THE CAPITAL CHARGES THERE ARE NO FIXED INCOME DIVISIONS BEATING THEIR COST OF CAPITAL. IF I RAN THE NUMBERS THIS PAST QUARTER, DESPITE A GOOD QUARTER, YOU'RE STILL NOT MEETING YOUR COST OF CAPITAL. CAN TECHNOLOGY PROVIDE THE NIRVANA OF A 'CAPITAL-LITE' FIXED INCOME MARKET MAKING BUSINESS?

JT: Absolutely. I think there's ways to do it where the bank is still in the middle of the trade rather than being pushed to the side. I think there are models that will come where you can thread the needle between having the bank do their job. But in a world where the market structures change, they don't have a balance sheet, so they can't do prop trading. Yet, they still want to provide liquidity to their customers I think those models are right around the corner.

WE HAVE SEEN FINTECH STARTUPS SUCCEED AND TAKE SHARE IN A NUMBER OF SECTORS OF BANKING: PAYMENTS, B TO B AND B TO C LENDING, MOBILE-BANKING APPLICATIONS, AND ROBO WEALTH ADVISORS. WHAT IS THE NEXT BIG THING?

JG: There are a lot of them. I wish I could go through them all, but it's one of the things that makes fintech so much fun. So, I'll just mention a few that we're really excited about right now, this is not exhaustive.

We think digital wealth management is going to transform the wealth management industry in the same way that the move towards passive has transformed asset management industry. And by the way, we expect the growth curve to look a lot like the ATM industry. I don't think there is a single third party projection for digital wealth management that doesn't start with trillions for how much will go into digital wealth management. So, that's a trend we are watching very closely and we think is going to stay with us for a very long time.

Marketplace lending we also think is going to be here for a very long time. Those platforms need to figure out long-term funding. We've all been through lots of cycles where specialty finance companies have had trouble getting stable funding and this industry is no different than that, so they'll have to

work that out. But long-term, that's an industry we also expect to have legs.

We think that the fastest growing industry in financial services is cyberterrorism, and the digital wallet has the potential not only to protect your identity, but also to be the Fitbit for financial services - have that capability to make sure your financial health is what you would like it to be and monitor your spending, rewards, coupons, and identity. We're very excited about that. We're very excited about a lot of new businesses that couldn't have existed were it not for the cloud, iteration of smartphones, the internet, and big data.

I'll just give one example which is when I started out in this business, when people would come to you with a product for small businesses you would say, "How are you ever going to get to them?" Because QuickBooks have been the only success in that. But now, you can get to small businesses and we're seeing some very interesting, some of the fastest growing companies that we know, serving that market because they can get to them because of the internet and the cloud and they can deliver the product because of the platforms they exist on. So, those are just a few examples, including prop trading, that basically everything that's happening in the banks in the way of market-making is going to move to electronic prop. It's not to say that the banks won't still have that connectivity with their clients, but I personally think it's going to look much more like the equities business more of an agency model than it is today and that's how the cost and capital equation fits.

WOULD THAT IMPLY THAT YOU NEED TO GET A STANDARDIZATION OF CORPORATE BONDS?

JG: Not necessarily, no.

DON'T 5 YEAR BONDS, BECOME 4 YEAR BONDS, BECOME 3 YEAR BONDS, AND SO YOU HAVE THIS CONSTANT CHANGE THAT'S GOING ON?

JG: Well that's why BlackRock has come out with this white paper, among other things, and said that maturity can be standardized and there is no liquidity. I think that what will happen is we will have electronic marketing firms that have balance sheets, hedge funds, and bisector participants that fill that void.

FOR THE BANKS THAT WERE HEAVILY REGULATED IN 2009 AND 2010, THERE'S A BELIEF THAT YOU'RE ESTABLISHING UTILITY, THAT THEY ARE GOING TO BE PROTECTED BY THE REGULATIONS AND NOBODY CAN COME BACK IN AND NO NEW BANKS ARE GOING TO BE FOUND – SO THEY ARE PROTECTED FROM FINANCIAL TECHNOLOGY. THAT DOESN'T APPEAR TO BE QUITE THE CASE. IT LOOKS LIKE THE FINANCIAL TECHNOLOGY SECTOR IS BEGINNING TO EAT AROUND, AND AT PIECES OF, THE BANKING MARKET. THE QUESTION IS, DO THE BANKS GO OUT AND ACQUIRE THE FINTECH COMPANIES? HOW DO THE BANKS WORK WITH THE FINTECH COMPANIES?

JG: A lot of this will depend on regulation and the way that regulation is moving. Will regulation utilize, but also protect, the banks? We've had a lot of discussion about fintech's specific regulation that has a lighter touch on non-banks and that's not just a U.S. phenomenon, but we've seen countries that want to be the global center of fintech, like the U.K. and Singapore, establish fintech specific rules and regulations that are lighter touch for the purpose of not protecting the banks. Letting innovation flourish and compete with the banks and then establishing what they call sandboxes towards that end as well, will that continue under the new government? Who knows. But that's the answer I would've given to your first question before the election results.

DO YOU THINK THE REGULATORS WILL ALLOW THE BANKS TO BUY FINTECH COMPANIES? SO, IN OTHER WORDS, IS THAT THE NEXT EXTREME?

JG: That's also a regulatory "Who knows?" Yesterday I would have said, if they [fintech companies] are small enough, they will let them. One of the surprising things to me this far on from the financial crisis is that the top five banks' balance sheets are bigger than before the crisis. We have not shrunk the banks and the new administration may not want to shrink the banks, but the prior administration did

want to shrink banks. So, the banks have been very limited in their ability to go out and make big acquisitions. Even some of the smaller banks, MNT took three years to close the Hudson City deal, so the regulators have not been encouraging M&A whether it's fintech or another bank or anything. The theme has been "Keep It Small If You Want to Make an Acquisition." Going forward, who knows, but I think that there could be some M&A going forward. I don't expect it to be huge, but there are value differentials, right? Until yesterday, JPMorgan was the only big bank that was trading not at a discount to book value. Fintech companies don't trade on a book value, so there are dilution considerations that also limit the scale of M&A that is likely going to happen between the traditional company trading at a discount to book and a fintech company trading at a multiple of revenue.

VL: In practice, though, you have to buy fintech companies as financial technology companies provide services to help financial service providers provide a solution, like for example an alternative lender. They probably should trade at multiple book, frankly, especially if you carry a balance sheet. Those companies are so vanishingly small at market cap but for regulation, that if the big banks believed they would actually be difference makers in their business models, I think you would've seen transactions already. I think it's an extremely bearish signal on the alternative lenders, frankly, that we have not seen on a really material strategic trade in the space.

SO, THE EXIT STRATEGY FOR PRIVATE EQUITY WOULD BE AN IPO?

VL: An exit for an alternative lender has been an IPO. As a private equity investor, I would never want to underwrite as my only exit being an IPO.

EITHER THE BANKS DON'T BELIEVE IN THE MODEL OR THE REGULATORS ARE PROVIDING REGULATORY GUIDANCE NOT TO?

VL: I do not believe a regulator has prevented a large bank from otherwise being really excited to buy an alternative lender. I do not think that has been a proximate cause of there not being M&A activity with alternative lenders.

LET'S TALK ABOUT THE WEALTH MANAGEMENT SIDE BECAUSE WELLS FARGO, MORGAN STANLEY, MERRILL LYNCH, THE BIG WIRE HOUSES, THEY DOMINATE THE $1-3 MILLION RETAIL ACCOUNT SIZE. THEY HAVE A TRILLION DOLLARS IN CLIENT ASSETS, 20-30% OF THAT IS AUM, FROM BEING A FEE FIRM. IF YOU'RE TELLING ME THAT THE ROBO-INVESTING SIDE IS GOING TO GROW LIKE THIS, IT HAS TO COME OUT OF SOMEBODY. WHAT DO YOU SEE, WHERE IS IT GOING? IS THIS ONLY A MILLENNIAL THING?

JG: I don't think it's only a millennial thing, but I think the model and the service delivery will be really different depending on the segment. Millennials are extremely receptive to digital wealth management and my favorite quote is that ¾ of millennials would rather go to the dentist than talk to their financial advisor. Millennials being open to different wealth management is what has gotten a lot of the press with the robo-advisors. But that's really a product for somebody with $25k, $100k to invest. Once you start getting into the hundreds of thousands of dollars, most people still want some sort of human involvement. And so, the models that we are seeing gaining traction in the mid-level net worth market, and even a million and above, involve an advisor. That's why we're seeing firms like Personal Capital, which is one of the fastest growing in the digital wealth space, and Blackrock, with their future advisor offering they're giving to some of their partners and traditional wealth managers, gain traction in the higher net-worth space because people do want involvement of an advisor.

But the takeaway should be that digital wealth management is going to impact people of every demographic - every age and every wealth. In some cases, there is going to be an advisor, especially with wealthier or older customers, who's driving that car for you. But the quality of advice, which is really institutional-quality advice delivered to retail

investors, is relevant for people of every age and every wealth.

WHAT ARE THE MORE INTERESTING ONES?

JG: I think Personal Capital has a really interesting model because they do have advisors you can talk to. Their average account size, which is about $300k, shows they are serving people with more wealth and we all know that the wealth is concentrated to people with more wealth. They also have customers that have far more wealth than those who are on the platform. The product they're offering is also quite differentiated in that they're not just packaging pre-existing ETFs - where the markets are liquid enough - they are buying individual stocks allowing a degree of mass-customization that is quite compelling for an investor. For example, if you worked for IBM for many years and already own a lot of IBM stock, you're not going to buy more IBM in your ETF - they can take that out. Or if you don't want it on sin stocks, or you do want it on sin stocks, they can customize what you own in your portfolios because of this direct ownership rather than just bucket of ETFs. It's also customized to your objectives, your goals, and your risk tolerance. So, it's not like there are these "X" number of fixed buckets and investors have to fit into one of them. It's really hyper-mass and individually customized in terms of the asset allocation and that's one of the reasons they are able to charge more.

First, they eliminate that second layer of cost from not buying a fund, and then the product can be tax-optimized and individualized so they are able to charge 85 basis points while the robo-advisors are charging more like 25 basis points. At those levels, I think that model and Personal Capital becomes a very interesting player in that field.

DO YOU LOOK AT THE WEALTH MANAGEMENT SIDE?

VL: I run fintech at our client and we also do pure-play financial services investing, so we go to TAMPS. We also have things that are a hybrid, like for example, we are trying to buy a large retirement record keeper. We've looked at a lot of the robos, and with robos, we take a slightly dimmer view just because we think that the underlying economics of the businesses just seems really hard - and this is from a, "I want to make the biggest multiple of my money" perspective, so keep that in mind.

"The best thing to generate real efficiency and real value to help the companies and the customers are the things that are happening in the middle and back office."

- **Vincenzo La Ruffa**

When I take a look at how these businesses grow and the lack of margin (aside from Personal Capital), all these businesses are gross margin negative when you factor in their customer acquisition costs. It just feels extremely hard when you're going after people with even $100k-200k, how you're ever actually going to make compelling economics fast enough before you're completely replicated by Schwab or Blackstone, who have spent so much money building their brand. So if you're Betterment, for example, hoping you'll be able to appeal to millennials by investing a lot of money in brand and then try and get as many as you can at negative gross margin, that does not feel like a recipe for success - that feels really difficult, and while you're on your way you might just not make it because, unlike other disruptive technologies that are really hard replicates of incumbents, creating a collection of ETFs cheaply (again, different from Personal Capital model) doesn't seem that hard to do.

I think we've already seen huge asset gatherings by the large incumbents. We think asset management technology is a really interesting space, but we think that the really exciting part about it is the least glamorous part. We think that the best thing to generate real efficiency and real value to help the companies and the customers are the things that are happening in the middle and back office.

SO, WHAT ARE THE CHARACTERISTICS THAT YOU'RE LOOKING FOR? AND WHAT ARE THE SECTORS THAT YOU REALLY WANT?

VL: My favorite word in fintech is "unglamorous," so anything that's B2C, anything that has the word "disruptive" in the deck, I think those are very overpriced and overheated and the bearings of outcomes is dramatic. I think much smarter people than me could figure out how to make money on them. What we really think is interesting is a couple themes: B2B, servicing infrastructure, middle and back office, and tech-enabled services as opposed to pure SAS. If I look across financial services, we think the real opportunity is how do we help large, medium, and small financial services firms provide efficiencies to processing, clearing, settlement, and any type of those processes, which historically have had some type of technology, maybe some type of manual process, some type of outsourcing. Because of the waves of technology that we've seen in the last few years, it can all be done a lot better from a blank sheet of paper. So, we're very excited about this illiquid credit market, but we're really excited about it from the back office.

SO, WOULD WE CALL THIS PLUMBING?

VL: I love that word, "plumbing." Any kind of plumbing or related compliance functions. The banks are really trying to shed balance sheet, and not necessarily size, but definitely trying to shed some of these functional areas, definitely trying to shed bodies, and there's really no competitive reason anymore for the banks to have these functions in-house.

Broadridge is a good example and I know lots of mini-Broadridges. I think Broadridge is a fantastic business and I think we're going to see more and more of these processes get out of the bank. We're very long administrators and we own one of the world's largest administrators, but we don't own a prime broker. But the administrative function, to take a particular slice of the pie, I think is a fascinating place to play, because I think that the administrator is going to continue to aggregate more and more services. The administrator is a very natural place for compliance, technology, risk management, reporting, all those functions have had continuity because they're holding so much of the books and records. They're the trusted third party source. We're seeing in our companies, whether it be institutional or more retail (like college and retirement saving), that more and more of those critical functions are going to hang on those providers - and that's more that you can charge.

THE BANKS CAN'T ACQUIRE THESE THINGS. VIJAY, ARE YOU GOING TO BUY THEM ALL UP?

VM: Well, that's something we've being doing a lot of over the past couple of years. We are a very active acquirer of plumbing-type fintech companies. Over the past three years we've deployed about $700 million in capital across about 12 transactions. What's so interesting about being an acquirer of these plumbing companies is the profile of the entrepreneur you meet. It's typically someone who has had a lot of industry experience. A lot of the stuff we do is back and middle office stuff, which is not that intuitive. You have to have been in the industry for a while to really understand the nuts and bolts of how this stuff works. So, we see a lot of entrepreneurs who have been in the industry 10, 20 years and they've decided to take the plunge. Or maybe it's their second or third company and they've built a business to a certain level demonstrating a good product market fit, and we think it's good in terms of our own strategic roadmap. But as is the case with a lot of institutional fintech stuff, it's really hard to take that business to the next level because of the hoops you have to jump through when you're trying to sell to a large institution – data security, cyber security, resiliency, and so on. Our view is that we can really help those entrepreneurs with those issues and in addition if we plug their company into our sales and distribution platform, so we can really help them take their business to the next level of growth. That's always a core thesis in any deal we do.

Strategically, to the extent one can apply strategy to the plumbing business, there are really four areas that we focus on. The first is helping our clients strive even to greater operational efficiencies, particularly in more complex asset classes. Some of the deals we've done recently are in the FX and derivatives space. We've bought a couple of companies that help drive more efficiency around securities lending and collateral management. There is better automation of accounting functions and that's probably the dominant theme from an M&A perspective for us. Secondly is around data and analytics, particularly for wealth and asset management firms. There's a huge appetite because of the fee pressure they're under to apply more data and analytics to the front-end of the business. Their thoughts are, "How can I do a better job targeting my customers? How can I develop more data-driven prospecting? How can I send out more data-driven market and compliance materials? How can I customize a product offering based on a rich set of data?" That's an area we spend a lot of time exploring. The third theme is around digital communication. There's obviously this very long-term secular trend of consumers wanting to receive their investor communications in a digital form. And just given the proxy investor communication side of our business, naturally that's an area we seek to be a leader in. We make quite a lot of investments in that space. The fourth theme is a little bit different. We act a little bit more like a venture capital firm where we make small minority investments. This is where we start to look at disruptive technologies or disruptive business models. Blockchain is an area we made a few investments in. We've also invested in Jim's company, LiquidX. But typically, the role we play there is really one of learning and understanding. How can we get close to this kind of innovation so we can help ourselves and our clients think through how to use these technologies or apply these business models to their businesses? Moving forward over the next couple of years our goal is to continue to deploy around $200-300 million and the good news is that the space, which was historically not that innovative, is starting to become extremely innovative. We've seen a lot more venture capital money and private equity money flow into the space. So, from an M&A pipeline standpoint, it's one of the richest I've seen yet in the industry.

DISTRIBUTED LEDGER, DISTRIBUTIVE CONTRACTS. IF YOU THINK OF BLOCKCHAIN, WILL CENTRAL CLEARING BE NECESSARY IN SOME FAR FUTURE REAL-TIME COMMUNICATION? IN OTHER WORDS, WILL DTC SURVIVE?

VM: Blockchain is a phenomenon which is getting a lot of hype in the industry and it is quite profound in many ways but there are also a lot of challenges in terms of driving real adoption in the market. The way Broadridge looks at blockchain is looking at the first use-case of blockchain, which is Bitcoin, and we view that as a profound innovation. It's really the solution to a computer science problem which hadn't been solved for decades. This idea that you can create trust between untrusted actors on an untrusted network and have that trust emerge as a result of game theory and distributive computing, we think of as a game changer in the long-term. Of course, Bitcoin is still very much a fringe technology and the conversation in our industry is very much being cobbled away from cryptocurrencies and bitcoin to the properties of the underlying distributed ledger. Given a lot of the economic pressure banks are under, blockchain is serving as a catalyst to understand how you can drive much more dramatic transformation in cost and operating models. And I'd say there are many mixed perspectives in terms of how effective blockchain can be in that area.

"…Blockchain is serving as a catalyst to understand how you can drive much more dramatic transformation in cost and operating models."

- **Vijay Mayadas**

You have blockchain doing some interesting things in things like international money transfer where there is a huge amount of jumping-off points and it's a pretty inefficient process. You're starting to see production blockchain use-cases in trade finance and also in private equity because there's a lot of inefficiencies in those workflows. In terms of core institutional Capital Market activities, most of the work done right now is really in the proof of concept phase. So, the idea is that, coming back to the DTCC question, it's going to be really hard to apply blockchain to large scale capital markets, clearance, and settlement activities because those processes are actually pretty efficient from a technology perspective today.

SO, IT STARTS FROM SOMEPLACE ELSE?

JT: If you think about the value-add of distributive ledgers and blockchain, the CUSIP world between CUSIP and DTC, it's a pretty good world, other than T+3 going to T+1, you know everything about those transactions - it is very standardized, it's very fungible, it moves around, settlement clearing is optimized. But in the non-CUSIP world, trillions of cash flows, trade finances, $15 trillion asset class that people don't think of as an asset class, bilateral transaction - everything is one off, everyone is worried about, "How do you verify that transaction? Do we understand that we did exactly the same thing? What if I want to sell it to another party?" This is a great barrier for blockchain in my opinion. In fact, the banks in Bath last week asked fintech, "Is fintech friend or foe? Do banks work with or against?" We went in with Broadridge to basically say, "How do you take this capability of blockchain and apply it to help banks think about the non-CUSIP world where trade finance is plagued with a lot of these issues?" So, I think the biggest bang for the buck should be in the non-CUSIP world.

JG: There are sectors of financial services that are just incredibly sticky. Credit cards have been around for about 50 years and people are still using a lot of cash in the United States. CCPs are another area where there are very few examples of open interest and margin wholesale get up and moving. It's about as sticky a sector of financial services as you can find. So, it's not enough to just have some incremental value proposition to move that open interest in that margin. So, my own view is that the more likely uses of blockchain for settlement will be in new areas where there's not already established open interest in margin and cross-margining opportunities, such as the example that Jim gave, or where an existing monopoly decides they want to move their open interest on to that blockchain structure and everyone, of course, is watching very closely what ASX is going to do in that respect, because if they wanted to do that they could, and of course they've partnered with Digital Asset in the blockchain area. However, the idea of someone coming in just because it's on blockchain moving wholesale open-interest in a massive market that's centrally cleared that's working, that is not something we're expecting to happen anytime soon.

VL: I agree with that comment, but what's interesting is that the areas that probably have the most increment of improvement is loans where we settle that T+24, T+21, that to get from T+24 to T+7, blockchain is not the way you get there. You don't need blockchain to create efficiency. You need process and more pedestrian technologies and the will and strength and conviction of the community. That's not a blockchain technology problem. So, you're looking for cases where the increment of improvement needed is big enough to warrant this huge change but it's not so big that there are actually other incremental solutions that get you a long way of the way there.

VM: I think that's a really good point. I think there's a fundamental question around how much behavioral change you have to drive to really enable the true power of blockchain. For example, clearing and settlement of credit derivatives, there are about 20 discrete pieces of information you need for that trade to clear and settle, and there's a huge amount of back and middle office enrichment which gets done before that happens. When will there be a

time when the trader will be able to put all of that into the information upfront so that trade can clear and settle in real-time or T+0. That world is probably quite far away. So, there's a lot of work right now exploring how you could drive greater efficiencies in things like credit derivatives and other areas as well but I think we could certainly prove what the technology can do in a prototype in a lab and the benefits can be quite powerful. The complexity is really going to be bringing it into the real world. And you have to drive those deeper behavioral changes.

I'll also make one other point, and this is related to Jane's comments around what the ASX is doing. We certainly have a view that blockchain will be adopted far more quickly in market structures which are a lot simpler than what we have in the U.S. today, like Australia and Asia. You have a very simplified market structure where ASX is essentially owning the CSD. We're seeing the most ambitious attempts around blockchain. The ASX that we're invested in for digital assets is looking to fundamentally re-engineer the cash equities clearance and settlement platform, and there are probably few markets in the world where you can actually do that. I think only time will tell how successful those methods are.

I'm certainly imagining a world where you have markets like Australia who progress very quickly in blockchain and markets with much more complex structures continue to adopt it on the margin for a much longer period of time. Potentially at some point when regulators, who have been a little bit mixed on blockchain, start to see the benefits, if they actually come to be realized in simpler markets, potentially at some point in the future they could drive it more in the more complex markets.

FINTECH FOR REGULATION, FINTECH FOR CREDIT, FINTECH FOR KNOW YOUR CLIENT, IS THERE ANYTHING GOING ON IN THAT? IS THAT THE KIND OF PLUMBING YOU'D BE INTERESTED IN?

VM: One of the theoretical benefits of something like blockchain is that, in certain areas, you can provide consolidated audit trail directly to the regulator, which is immutable. The way regulators try to track derivatives trades today is very complex and there are a lot of breaks in that process. Blockchain could potentially provide a level of transparency to the regulators which can't be achieved today using the existing technology. So, that could be an area which, over time, gets a lot more interest from the regulators.

VL: We own a business called Fenergo that solves actually a subtly, extraordinarily complicated problem, which is client onboarding. If you're an existing investment bank with an existing asset management client and you want to open up a new desk-to-desk relationship, that process can take months. That is lost revenue and lost trading opportunity. That is one hand a data problem and also one hand a workflow/plumbing problem. That problem takes ingenuity and a really elegant technology solution, but it doesn't really need blockchain, it doesn't need SAS, it doesn't need robo. It just needs a really well thought out plan and an owner in the bank that thinks that this is important and relevant. In the world of consolidation, getting new providers for these banks can be really tricky - and that's a sufficiently large problem. It's a seven to eight figure solution to solve a nine figure problem. I think that how we do client onboarding is going to radically change over the next few years by using really elegant and distinct technology.

FOR PAYMENTS, WILL SWIFT, VISA, AND MASTERCARD SURVIVE? WILL THERE BE A RADICAL CHANGE IN THE PAYMENTS BUSINESS OVER THE NEXT 10 YEARS?

VL: When you look at the value chain of a payment card swipe, a credit card swipe today, what's going to get squeezed? It's not simply the Visas or Mastercards that are the points that are going to get squeezed, it's really more down-market, the merchant-acquiring part. That's the part that I think is really under a lot more pressure. I think Visa and Mastercard and credit card providers in general have built extraordinarily complex moats around their

businesses, and they provide a very good service. It's not so clear to me that there's a problem to necessarily be solved there. I think a fascinating example is that we moved to a version of EMV in the US and I think most people view that as well-intentioned, as it was meant to solve a lot of security issues. That's been a degradation and the worst experience for the average consumer. It takes a long time when you're in a cab and you have to swipe or stick the card in. That's a good example of a technology innovation that's actually moved backwards in our service because people are actually very happy with the way the rails work today. My point is, I don't think you're going to see a radical change in that behavior, whether or not those rails exist by swipe or through a wallet. I think that's here for a long time.

JG: I think the answer is different by geography. So certainly, in the U.S. 10 years isn't a long time, but for the foreseeable future Visa and Mastercard have such extraordinary market power that everyone's going to have to work with them rather than against them. And you've seen that in the way that PayPal and ApplePay and certain others have gone to market. You just don't want to mess with Visa and Mastercard in the United States, but, in Asia, it's a very different story. China is a great example of a market where, first of all Visa and Mastercard don't have a meaningful position, but even the Chinese government-owned COG hasn't had the same blocking position in China. It's kind of like the cell-phone industry, which in many Asian markets leap-frogged technology here in the United States, and we are seeing the payments industry evolve very differently and potentially leap-frog us in China.

NEW FINTECH CENTERS – U.S., SINGAPORE, THE U.K., THE E.U. – WHO IS PUSHING AHEAD AND WHOSE REGULATROS ARE TRYING TO FACILITATE IT?

JG: The U.K. and Singapore are great examples of two governments that have fintech religion. They are passionate and visionary about the coming fintech capitals of the world and they start from the position where already their regulatory landscape is much simpler than ours. We have many great strengths in the U.S., but one of them is having such a history of ambition and entrepreneurial spirit and we have clusters of great innovation that feed off of each other, and that is a great advantage to fintech and quite a lot of great fintech companies have been established here. But the regulatory landscape here in the U.S. is a disadvantage, in some respects. And one that is right there at the top of my list is the many regulatory bodies that a fintech company and any financial services company has to deal with and the challenges of getting an answer on how to do business. It can be 50 different states and 50 different regulators. But even if you're not dealing with 50 states you can be dealing with a dozen regulators, and that is a big disadvantage versus, for example, the U.K.

AS FINTECH EXPERTS, THE MODEL OF BANKING – LET'S GO OUT SEVEN, 10 YEARS - WHAT DO BANKS LOOK LIKE? DO THE BANKS INVEST IN THEIR OWN TECHNOLOGY? DO THE BANKS BUY TECHNOLOGY FIRMS? ARE THE BANKS EMPTY BUCKETS WITH TECHNOLOGY SILOS STUCK INSIDE THEM AS THIRD-PARTY SUPPLIERS GOING THROUGH THEM RUNNING THROUGH A PRIVATE LABEL?

VL: I think that they are companies that are consumers of technology - from Broadridge, FIS, a dozen relevant names - they are people and they are balance sheets. Everything else over time, with the exception of front office code or algorithms, everything else will be outsourced.

JT: I tend to agree in the sense that when you look at one bank versus another bank, they're all basically doing a lot of the same things. So, there's a lot of economies of scale of leveraging or outsourcing the common denominator technologies that everyone is doing repetitively every single day. So, I think whether it's in the back office with Broadridge or the front office with us, you'll see more and more banks outsourcing and leveraging those technologies. It could be anything from a light thing like, "I'll use LiquidX to originate and distribute loans or non-CUSIP assets," to a heavy uplift in the back office,

but I think every bank is going to have to do more about this.

VM: I would agree. I think, certainly there is the ROE pressure that we've all seen since the financial crisis that has driven a lot of banks to take a real hard look from a tech and ops perspective at what's really differentiating and what's really not differentiating, and so there's been a lot of conversations around this concept of industry utilities. There have been mixed successes around that. There is a pretty broad consensus in the industry around what a utility should be. So, there's the idea that you have a bunch of banks getting together on a shared technology platform with a common operating model where they consolidate structure with pricing based on SLAs and so on. There's pretty good agreement that those are their intrinsic attributes of a utility. There's quite a lot of debate around what the right economic model should be - Should it be an industry consortium? Should it be a bunch of banks getting together with a technology vendor? Should it be for-profit or not-for-profit type of vehicle - and those sorts of conversations are going on and getting flushed out. There have been attempts to create new, multi-tenant industry utilities and that's where we've seen the most intensity in the industry and also the most amount of challenges in terms of actually getting something off the ground; so, in the world of post-trade, for example, there have been multiple initiatives where the idea of taking "best of breed" technology out of one bank and piecing it together with the next bank to create this industry-wide utility. Most conversations have typically not gone too far because of the intrinsic complexity of this - it's hard to agree on who has the best technology assets, so where we've seen a lot of interest over the past 6-8 months is around how do you leverage an existing, multi-tenant platform to basically broaden what they do today to evolve to utility.

In the case of Broadridge and our fixed income business, we have 18 of the 23 primary dealers on our platform. So, the conversation we have with the remaining primary dealers is very much around, "How do we take what works today at scale and minimize the conversion risk for you to move onto a utility-type model?" Those conversations appear to be getting a lot more traction versus how do we recreate a new, multi-tenant model from scratch. Our view is that's going to be the way things evolve moving forward and over time, and I think I agree with everyone that a significant portion of non-differentiating stuff is going to be in some sort of utility model.

WHAT'S SLOWING THIS DOWN? IS IT JUST NATURAL INERTIA OR IS THERE A LOT OF ACTION BEHIND THE SCENES? DO YOU NEED A TURNOVER OF SENIOR MANAGEMENT TO RADICALLY CHANGE THEM?

VM: There's a lot of action behind the scenes. Banks historically are really innovative in terms of using the latest technology because what they did was very complex. There's a lot of pride in what we've built. I think that ethos is changing over time. I think that a lot of these projects when you are moving big chunks of your tech and ops to a utility model entail a huge amount of risk. And a lot of folks aren't that comfortable with taking on that risk at this point in time. What I think that's changed is that the operating model discussion is really elevated to the C-suite given all the ROE pressure, so I think there is more strategic thinking being done around how we should evolve.

JT: I think it depends. The back office is like heart surgery, it's a significant thing to move over. But in the front office, there are plenty of applications where they see it like we have experiences where we show the banks what we're doing and they say, "Can I take this with you to a customer tomorrow morning or next week, because I have an opportunity but I don't have the technology in the front office anymore that we haven't invested in in the last 4-5 years." So, because it's lighter touch, you're able to do that a little quicker.

IS THERE AN INSTITUTION THAT YOU SEE THAT'S LEADING IN FINTECH ADVANCEMENT? PRESUMABLY

THIS IS A BANK – WHO ARE THEY? AND WHAT ARE THEY DOING THAT OTHER PEOPLE AREN'T DOING?

JT: I'm not going to name names but I will name type - large international banks that are usually not strongest domestically, but they're playing offense in another part of the world. They don't have their resources, so they're more inclined to say, "I need fintech to break into this because this is not where I dominate and I need to distinguish myself or leverage somebody else's platform." For example, we've seen a lot of European banks help using us in the United States.

JG: I think UBS has done some innovative things, partly out of need because they were one of the first banks that really had to downsize in fixed income. They almost moth-balled on all of that 30-year software and just started again with an outside vendor, Ion, who was able to give it to them better, faster, cheaper, and deliver what they needed. I think that was pretty innovative. Recently, you've seen headlines in their wealth management area where they've partnered with SigFig in the robo space and also with Amazon to use Amazon Echo to deliver the Alexa version of wealth management, "Ask UBS." The jury's out on both of those wealth management initiatives, and while they are brand new, those are some examples.

VM: I've certainly seen a lot of our clients have a much greater appetite for innovation. A lot have been setting up their own incubators and have their own corporate venture funds and so on. What we have seen, which is different, is thinking about these different innovation models that a bank could drive: one is they drive innovation internally, secondly, they could drive it with a startup - you see a lot of that happening in the blockchain world – and third is co-innovation with a larger fintech provider. I've seen a lot more interest around that third model because I think there's a sense that it's really hard to drive innovation internally given a lot of the other pressures they're under.

It's hard to drive innovation with a startup because perhaps they have great engineering folks, but they don't appreciate the complexity of bringing things to scale and things that can plug into an existing ecosystem. So, there's a lot more interest in, "how do we innovate with Broadridge?" One of the things we are thinking through is, "How do we develop a model of co-innovation with banks and our clients around disruptive technology?" And that's something that is quite new for us.