

A STUDENT PUBLICATION FROM THE IVEY FINTECH CLUB

IVEY FINTECH

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# PERSPECTIVES

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## A Message From the Editors

In 2016 Scotiabank donated \$3 million to Ivey to establish the Digital Banking Lab, a project designed to help position Ivey students as thought leaders and develop future talent in a growing digital world.

Through this partnership, Scotiabank recognized that the development of this industry is not going to come from the board rooms of the world's largest corporations, but rather from young, driven, and innovative thinkers with an appetite for taking risks.

The initiative has already begun to pay dividends. A growing number of Ivey students, past and present, are now looking at the opportunity present in FinTech and are quickly establishing themselves not only as members of a high growth industry, but as leaders of it. As this program continues to make career defining impressions on Canada's top young business talent, we expect this trend to continue.

The importance of these initiatives also grows by the day. The world of finance and banking has changed dramatically over the past 20 years due to

advancements in technology and its impact is accelerating. Technology stands to have profound implications on the future development of business and will likely challenge our notions and reimagine what we even thought could be accomplished in these industries.

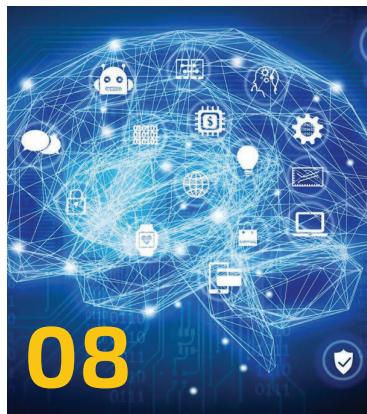
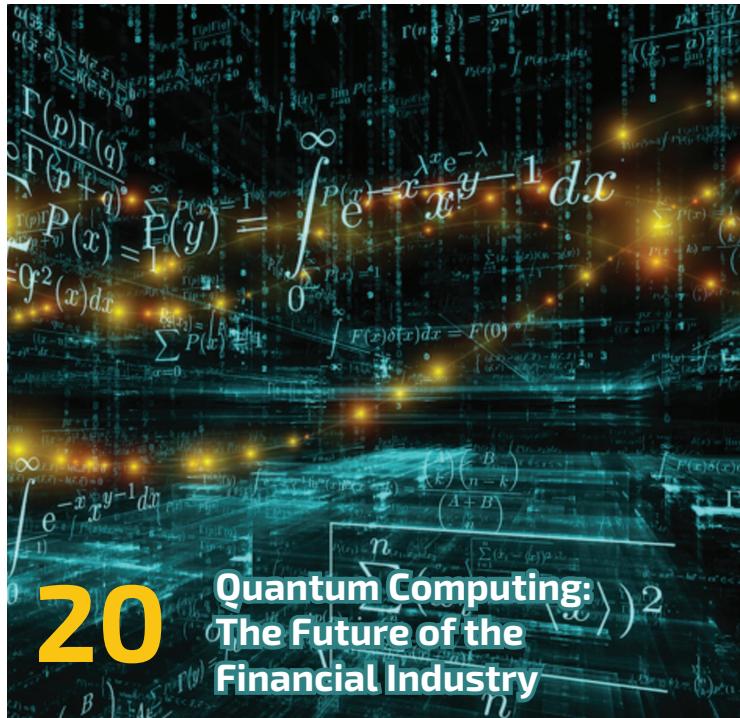
The Perspectives is a platform for students to voice their opinion, share their knowledge, and to educate and allow readers to keep their fingers on the pulse of important trends at the intersection of finance and technology. It was created entirely by some of the brightest Western & Ivey students. We cannot thank the research and editorial team enough for the curation of this edition.

There will be a second edition created during the winter semester. If you would like to be a content creator for The Perspectives, please reach-out to either Jack West or Arielle Luder.

**Arielle Luder**  
Co-Head of Research  
Ivey FinTech Club

**Jack West**  
Co-Head of Research  
Ivey FinTech Club

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# **Canada FinTech Project**

# Michael King

Want a great job with a FinTech start-up? Interested but don't know where to look? How do you identify leading entrepreneurial FinTech companies when they aren't even advertising yet?

# Welcome to Canada FinTech! This website profiles the Top 150 Canadian FinTech companies under ten

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This website contains **profiles of the top 150 Canadian FinTech companies** classified under 10 business segments. These profiles have been written by Ivey HBA students under the supervision of Prof. Michael R. King, co-Director of the Scotiabank Digital Banking Lab at Ivey Business School.

Our goal is to **promote Canada's FinTech ecosystem, connecting entrepreneurs & founders with potential partners, investors, employees, customers, and other stakeholders**. We also want to educate students on career opportunities with these innovative FinTech companies.

To suggest changes, updates or additions to this website, please email [canadafintech@ivey.ca](mailto:canadafintech@ivey.ca).



Professor Michael King, co-Director  
Scotiabank Digital Banking Lab

## FinTech Categories

▼ Crowdfunding	▼ Blockchain & Crypto	▼ Capital Markets & Trading
▼ Infrastructure & Services	▼ Banking & Personal Finance	▼ Wealth Management
▼ Lending & Credit	▼ Security & Identity	▼ Payments & Money Transfer
	▼ Insurance	

lines of business. These profiles have been written by Ivey HBA students under the supervision of Prof. Michael King, co-Director of the [Scotiabank Digital Banking Lab](#) at Ivey Business School.

The profiles can be found at [www.canadafintech.ca](http://www.canadafintech.ca)

The goal of the Canada FinTech project is to promote Canada's FinTech ecosystem, connecting entrepreneurs & founders with potential partners, investors, employees, customers, and other

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SCOTIABANK DIGITAL BANKING LAB

# Wealthsimple

Scotiabank Digital Banking Lab > Canada FinTech > Wealthsimple

## Wealthsimple

Health Management | Toronto, ON | Founded: 2014 | Employees: 175 | [www.wealthsimple.com](#)

PHONE: (855) 255-9038 | [LINKEDIN PROFILE](#) | [BLOOMBERG PROFILE](#) | [TWITTER](#) | [WIKIPEDIA](#)

Last updated November 15, 2018 | To download a PDF version, [click here](#)

## Company Overview

Wealthsimple is an online investment management service based in Toronto, enabling clients to invest their savings and build diversified portfolios comprised of exchange traded funds. Aimed at making investing easier for millennials, there is no minimum investment amount and fees are lower than the industry average. Unlike many robo-advisors, Wealthsimple also provides access to human advisors via phone, email, text message, or video chat.

### Senior Management

**Michael Katchen** Co-Founder and CEO (2013-Present). Previously: Country Director, Canada, Ancestry.com (2013-2014); Product Manager, Ancestry.com (2012-2013); Vice President, 1000Memories (2011-2013); Business Analyst, McKinsey & Company (2009-2010); Education MBA (HBA 2009), Ivey Business School.

**Brett Hanyecz** Co-Founder and COO (2013-Present). Previously: Director, Ancestry.com (2012-2014); Co-Founder 1000Memories (2010-2012); Engagement Manager, McKinsey & Company (2006-2010); Education, BA Economics and Math (2003), Boston College; MPHil. Economics (2006), University of Oxford.

**Karim Yousaf** Chief Technology Officer (2018-Present). Previously: VP of Engineering, Wealthsimple (2015-2018); Software Development Manager, Amazon (2009-2015); Education: Bachelor of Mathematics, Computer Science (2005), University of Waterloo.

**stakeholders.** We want to educate Ivey and Western students on career opportunities with these innovative FinTech companies.

Want to get in on the ground floor of a FinTech start-up as an intern or maybe full-time? This is the site for you. Learn about the founders, their business model, key developments in the company's history, their financing, and their competition all in one place! Canada FinTech is a one-stop resource for researching potential employers, prepping for an interview, and identifying Ivey alumni who have started their own FinTech company.

Imagine this scenario. You are a FinTech entrepreneur like Wealthsimple's founder, Mike Katchen (HBA '09). You have just secured \$2 million in your initial seed round. Congratulations! Now you need to grow your business and you need to do it fast. One of your biggest problems is finding good employees. You have fewer than 10 staff and you don't have an HR manager yet. You need new hires who are knowledge able about FinTech and know about your company. How do you find the right employee? Simple, the employee finds you first! They know about your industry, your company, and your value proposition. They are up-to-speed on the latest trends in FinTech. And they know a lot about your competition.

Canada FinTech is not only for finding jobs. Maybe you are looking for a company for your Ivey Field Project (IFP). Or a cool speaker for an on campus event. Or you want to provide pro bono consulting as part of the Ivey FinTech Club. Canada FinTech is the resource for you.

Develop your reputation as a FinTech thought leader. How? You can use Canada FinTech to identify a company and write an article for the next issue of The Perspectives.

Or you can become a FinTech researcher and contribute a write-up for a new FinTech start-up with your name and photo attached to it. With FinTech growing and set to become even more important in years to come, get a head start on everyone else using this website as your personal guide.

If you have ideas for new companies, or suggestions and corrections for existing companies, please email  
[CanadaFintech@ivey.ca](mailto:CanadaFintech@ivey.ca)



# The Evolution of Mobile Payments in China

Nathan Shao

During a recent visit to Shanghai, I had noticed the abundant use of technology for the transfer of funds. For instance, calling for a taxi or rideshare would be only a few simple clicks away with Didi Chuxing, a Chinese ride-hailing app. A cashier would be surprised if you did not pay with WeChat or Alipay at the grocers or in restaurants. But, this was not the technology savvy China that I had known during a previous visit 4 years earlier. How did we get to this point, where the once heavily used source of payment known as 'cash' has become almost obsolete?

## History of Online Payments

E-payments originated in the 1990s, with the Stanford Credit Union as the first financial institution which offered online banking. Then in 1994, Pizza Hut started to accept online food

orders. Next came PayPal, founded in 1999 as a company that operated an online payment system which served as an alternative to traditional paper methods such as cash and cheques. At the time, they were innovators in a fairly nascent industry of e-payments. Initially, people avoided e-payments as there was a lack of trust of having their money in an online system. As technology improved, e-payments became more secure and efficient, resulting in a growth in popularity. E-payments were sought as convenient as they were instant and quick, reducing transfer costs and time in-between transfers.

Moreover, for businesses, e-payments reduce the risk of receiving fake bills. Consequently, e-payments became widely adopted, with additional e-commerce sites such as Ebay and Amazon requiring them. As Paypal established a foothold in the

market since its inception, they quickly rose to the top, becoming one of the largest worldwide platforms for online payments today. As of today, Paypal has a \$101.11 billion market capitalization, which further shows their market domination.

## Rise of the Chinese Giants

E-payments have since become a method of payment utilized around the world. China, specifically, has been leading the global cashless trend with a mobile payment market of US\$12.77 trillion. Currently, Tencent's WeChat Pay and Alibaba's Alipay account for 90% of the mobile payment industry.

Alipay was launched by e-commerce giant Alibaba in 2004, creating an easier payment system for their customers. Initially, there were many transaction failures due to a lack of trust. Since then, they have improved their payment infrastructure and grown to be a

## Active Users (millions)



WeChat Pay



leader in the industry. As of 2016, they have a 54% share of China's \$5.5 trillion mobile payment market. On the other hand, WeChat Pay was launched in 2013 as a payment service for WeChat, the largest social media app in China. As they already have an established customer base, WeChat Pay took a large portion of the mobile payment market immediately. Alibaba's foothold in the e-commerce market and WeChat's prominence in the social media market allowed both companies to easily capture the emerging mobile payments market.

The two companies' successes are also fuelled by society's transition towards efficient technologies as a whole. According to a study by Ipsos conducted in 2017, 40% of the Chinese population regularly carry less than 100RMB (about \$16 USD) of cash when outside. Cash and cheques have become a hassle to the average consumer, and utilizing technology for purchases has become the primary alternative.

### How Easy Is The Process?

Both WeChat and Alipay have utilized the increase in smartphone usage to their advantage. Whether it's in a taxi or on the cash register in grocery stores, a quick response

(QR) 2D barcode can be found. The customer has to simply open the WeChat or Alipay app and scan the code, which will provide access to information stored in the QR code. Money will then be transferred from the customer to the seller. The customer and seller both have bank accounts connected to the app, allowing the transaction to occur. Overall, this makes the whole process more efficient without any time delays between the customer paying and the seller receiving the money.

merchants who would implement their payment systems. This means that more American retailers will accept WeChat and Alipay for payments. Moreover, WeChat Pay has already created features that would make it more appealing to foreign users. One example is "Go Dutch", a feature that allows WeChat users to divide up a bill and pay using the app, which would appeal to foreign customers who are more likely to split the bill. Furthermore, due to a recent boom in Chinese tourism, more merchants from around the world may want to adopt the new mobile payment strategy to better serve their customers in a quick and reliable fashion. One downside is that traditional consumers, who still choose to pay with cash, may be left out of the picture. All in all, there is a positive forecast for the mobile payment market. As the market continues to grow, demand and supply for efficient technology both increase. With the speed at which society is transitioning towards mobile payments, during my next visit to China, I may truly see a cashless society.

### The Future for Mobile Payments

As society continues to become technology dependant, more and more users will begin to use forms of online payments more frequently. Although Alipay and WeChat Pay are large players in China, they seek to expand to foreign countries. There is a good reason for them to expand, as the global mobile payments market is expected to grow to USD \$3.3 trillion by 2023. Both Alipay and WeChat pay have recently expanded into North America to match the influx of Chinese tourists overseas. Instead of creating an equivalent app overseas, WeChat and Alipay have focused on signing oversea

# Blockchain Beyond Bitcoin: Eliminating Counterfeit Goods

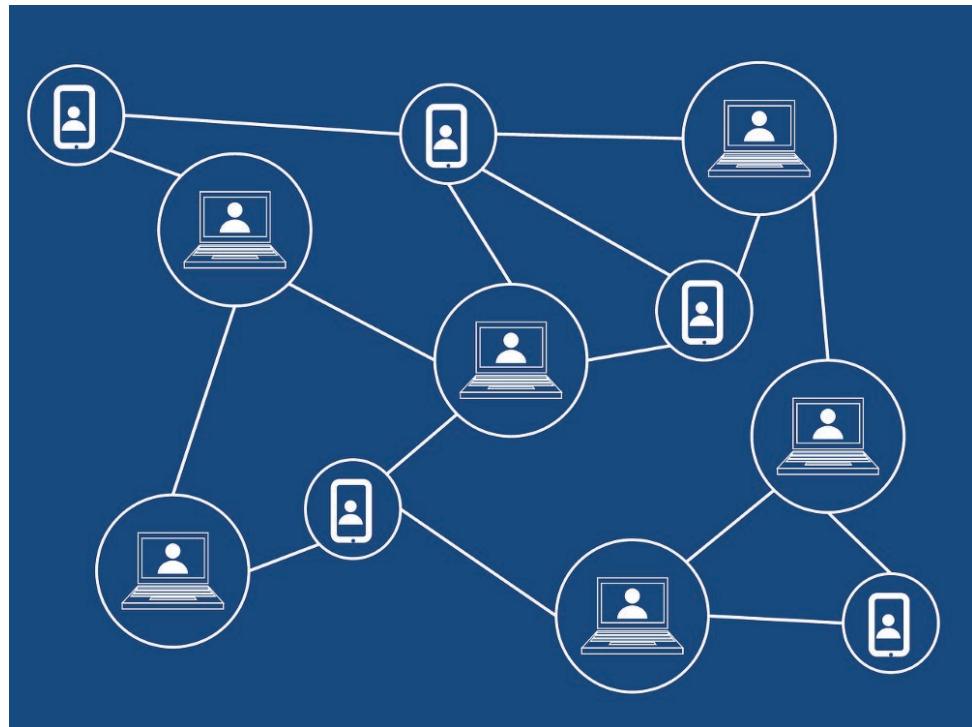
Caroline Glavind

Media coverage of blockchain technology has become synonymous with Bitcoin. It is no secret that cryptocurrencies have been extremely volatile and pose regulatory challenges as an alternative asset class. This has caused underlying technologies like blockchain to be overlooked. I would like to shift your focus toward some other uses of blockchain that have the ability to disrupt, and add value to industries beyond cryptocurrency. The combination of blockchain and the Internet of Things has tremendous potential to provide tech solutions for supply chain transparency and eliminate counterfeit goods.

## Blockchain and the Internet of Things

Blockchain is intrinsically linked to Bitcoin because it was originally created to solve the double spend problem. Digital information can often be easily replicated, which leaves the potential for the double spending of cryptocurrencies.

Blockchain preemptively stops double spending by sharing all transactions in a network available to the users. This way, if two transactions using the same currency are submitted, only one of them will be confirmed by the network because they are



traceable to the original source. For example, if you were to send one Bitcoin to a peer, the transaction would be placed in an unconfirmed pool before being added to the chain. When the transaction is being confirmed, every node in the network verifies it. If the same Bitcoin is sent to two different peers, the first transaction would be added to the blockchain and the second would be rejected. At its core, blockchain is a way of recording information in a secure, and indelible way. It removes the need for trusting a third party by securing information through a digital ledger that is only verified when majority consensus is reached. This provides transparency to all parties eligible to view the record of transactions. Each block along the chain is identified by a digital signature, or cryptographic hash. Each block also contains the hash of the previous block. This way, the information can be traced back to the genesis block, which is the first in the chain. Access to the blockchain can be limited or expanded based on the needs of the user which makes it ideal for corporate use.

The Internet of Things (IoT) refers to a system of objects that are interconnected and share data. Chances are you probably own something that is an IoT device, and it could be as simple as being able to turn off your lights with an app on your phone. However, applications for IoT extend far beyond simple household tasks. The latest luxury item you've been lustng after likely will be manufactured and distributed using IoT and blockchain technology in the near future. The more devices that share data with one another, the more interoperable your devices become. The digitalization of consumer goods is becoming necessary because the counterfeit market has continued to grow.

## Protecting the integrity of luxury brands

The Global Counterfeiting Report 2018, estimated that luxury brands incurred a loss of 98 billion USD due to counterfeit sales. 30.3 billion of this loss was from online sales. To provide meaningful comparison, global illicit drug sales are currently estimated to be 330 billion annually, while total counterfeit sales are valued at 461 billion annually. These numbers have grown significantly with the rise of e-commerce and are forecasted to grow further to 991 billion by 2022. The proliferation of counterfeit goods has become increasingly problematic for luxury goods companies whose revenue is driven by exclusivity and brand recognition. The growth of luxury brands is determined by the company's ability to preserve originality and justify a premium price. To mitigate the risk of dilution, production is limited by almost all luxury brands and it is not uncommon for items to be sold out for months at a time to preserve scarcity. This means that counterfeit items flooding the market can devalue the original goods significantly. This has been the case with several Louis Vuitton monogram items which are easily replicated and hard to distinguish from counterfeits. Louis Vuitton has been particularly aggressive and allocates a yearly budget of 19 million to combat counterfeiting. Blockchain would allow for brands like Louis Vuitton to pursue protection through more effective avenues than litigation.

## Solving the counterfeit problem

Blockchain and the Internet of Things have the potential to help curb the counterfeit luxury goods market and eliminate the possibility of human error in authentication.

This technology is already being implemented in the pharmaceutical industry to track drugs throughout the supply chain with the use of near field communication tags. It can be similarly applied to the manufacturing and distribution of goods like jewellery, clothing, shoes and handbags.

Placing a near field communication (NFC) tag in goods during the manufacturing process would allow for progress to be tracked throughout the supply chain. NFC is a method of wireless data transmission between devices that are in close proximity. Similar technology is used for Apple Pay on iPhones. The combination of NFC and blockchain would create an impenetrable way of recording data. By keeping updated information on a tag inside the product, data can be provided about the origin of materials and point of sale. The transparency this technology would provide has several upsides for both manufacturers and consumers.

Blockchain can help create a more transparent resale market. Presently, there is no single channel for consumers to authenticate their goods. This leads to reliance on third party authentication. However, this doesn't stop counterfeit items from being sold on popular platforms like eBay. Since there is no digital way to confirm if an item is genuine, serial numbers and authenticity cards can be easily forged. Unless

the buyer knows exactly what they're looking for, there is an issue of asymmetric information. It becomes especially difficult to authenticate goods such as scarves and sunglasses that often do not have significant differentiating details. Blockchain can streamline the entire process by helping buyers

be more informed and eliminating the need to trust a third party. It will also have the ability to link the brand and end user even if the item is sold in the resale market or gifted. Producing realistic counterfeit goods would become much more difficult with the use of NFC tags and blockchain. The implementation of this technology would also benefit manufacturers by legitimizing the secondary market for end consumers, which would deter counterfeit production.

The Internet of Things provides a platform, blockchain provides security, and near field communication provides a way to transfer data between users. While luxury brands have been slow to adopt it, blockchain is something we will be hearing more about as it becomes a new way for brands to manage counterfeiting and link the product from raw material to end user.



# Machine Learning and Big Data in Private Equity: Is Networking Still Needed?

Andrew Li

The private equity industry has historically relied on networking to find investment opportunities. However, the perks of using big data and machine learning for deal sourcing have turned the heads of managers at private equity firms.

Many household name companies have received funding from private equity at one point in time. FedEx, Intel and Cisco Systems are all examples that you may recognize. Without the funding, these companies would not be as well-known as they are today.

The relationships between investors, private equity firms and their limited partners have proven

to be beneficial for all parties; however, technological innovation changes these relationships and the way firms operate. The use of machine learning disrupts traditional deal structures and improves firms' deal-sourcing and client interaction abilities.

## The Traditional Way

Traditional methods of investment decision-making for private equity

firms are based upon human interaction and meeting potential clients face-to-face. Sourcing deals depends on these connections and the firm's ability to network effectively.

Following the capital-raising stages, firms use proprietary deal flow, a method of applying connections with the lawyers, accountants and executives of the industry to find investment or

buyout opportunities before other competing firms. Joint deals, called syndicates, are also considered if the partnering private equity firm does not have the funding to enter a lucrative deal by themselves. The larger the network of a firm, the more connections it can use to find another company in search of funding or buyout. Following the connection, the firm may analyze the client's financial and performance data to further understand if an investment would be feasible or not. These concepts are the foundation of private equity and venture capital deal structures.

Traditional methods have been effective for the decades that private equity has been around. They have made name to some of the biggest private equity and venture capital firms in the world, such as Goldman Sachs, Accel and Sequoia Capital. But other than basic financials of a company, how else may a firm use big data to support their investment decisions?

## Too Much Data—Is it Good or Bad?

Thousands of businesses enter the market every day. As capital continuously pours into the industry, the decision-making process for private equity firms becomes increasingly difficult.

The abundance of data and crowded markets have created the need for more complex analyses. With the flood of tech startups today, many businesses appear to be almost identical at first glance. The opportunities for investments have increased, but they have come with the challenge of finding the viable ones among the potential failures.

**This is where software may**

**come in handy. Firm's need to be able to:**

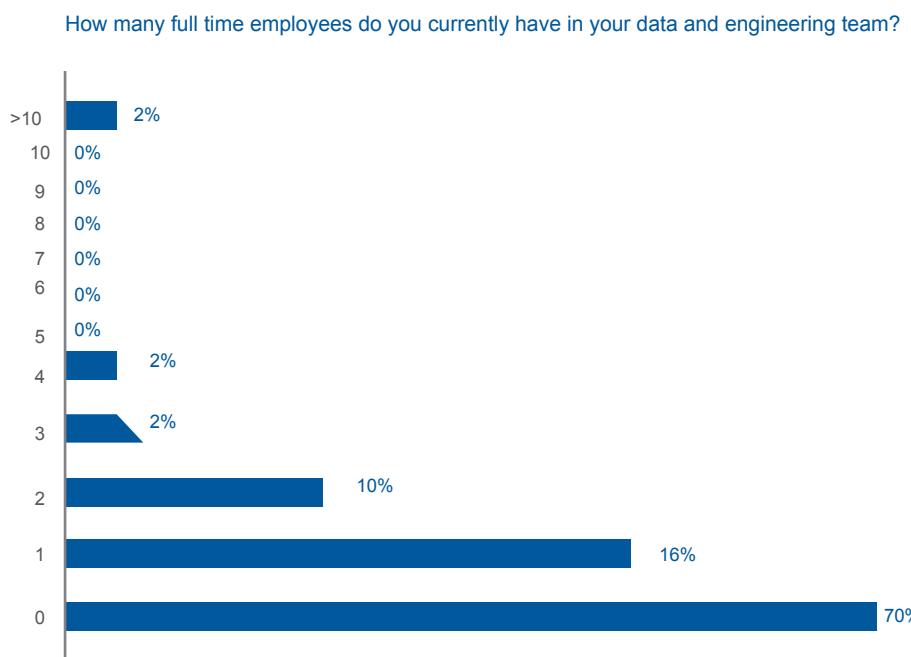
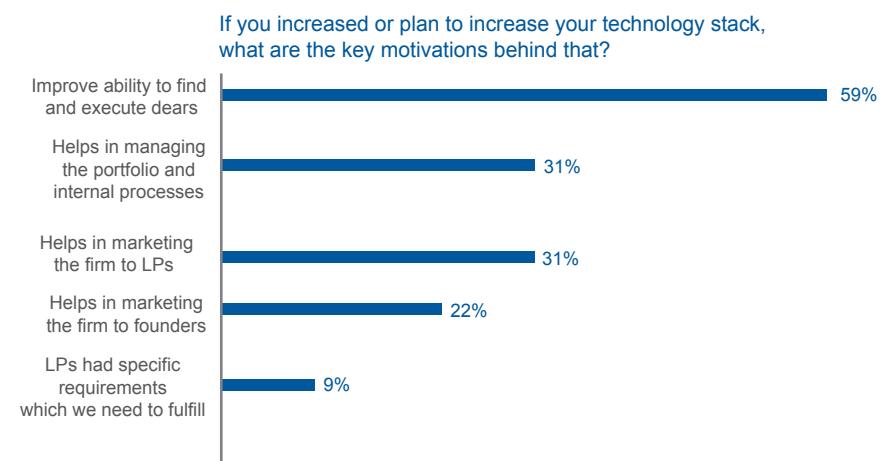
- Analyze companies by the masses
- Process large quantities of data to identify trends, creating clearer graphs that allow for easier comparisons between the startup and the rest of the industry
- Use the results to determine the startups with the most promising growth potential

The following survey conducted by Blue Future Partners and PEVC Tech shows the reasons why firms are inclined to use machine learning in their operations. Out of

the 137 responses, the majority agreed that they wanted to use software to improve their ability to find and execute deals.

But the use of machine learning software and artificial intelligence in venture capital is not just an opportunity for firms. Today, it is becoming a trend. When one firm adopts the technological approach of finding startups, other firms are forced to do the same to remain competitive. The 137 private equity firms were also asked about how they expect to approach the new trend of using big data and machine learning software. The surveys produced the following results:

Traditional methods are still common, but there is a clear



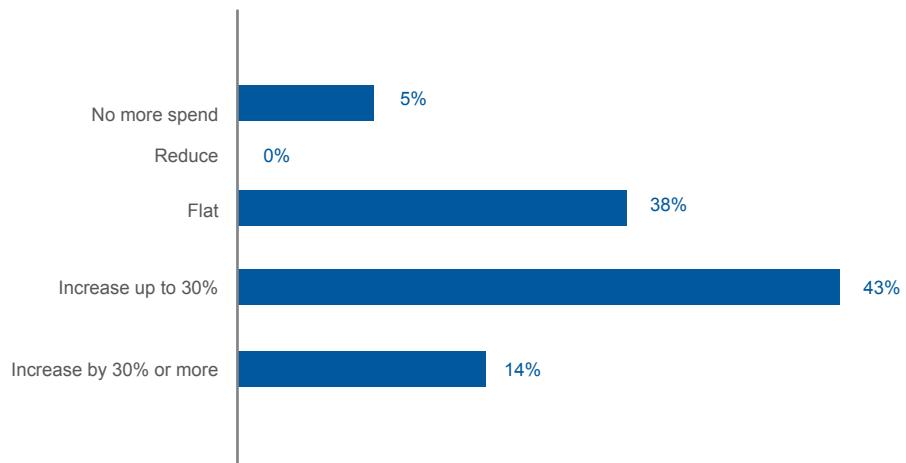
movement towards the use of data analytics—especially in deal-sourcing—as firms dedicate more funds towards software development. Although the types of deals may not change, firms are now expanding their investment teams to digitize their structures of deal sourcing.

## The Digitized Way

Digitization is showing no signs of stopping as it incorporates itself into the operations of many firms. As time passes and more companies prosper and fail, there is more data for private equity firms to use. As a result, this has led to the increased usage of data analytic driven investments. The private equity industry is a world of risk and payoff, but digitized firms using machine learning technology greatly reduce their risk and reap larger returns from startups growing into large companies.

A survey conducted by KPMG asked several private equity firms about their take on big data and machine learning. 79% were aware of the technology, 9% were considering implementing it, and 12% were already using a form of related software. Based on historical data, Critical Future projected that AI and machine learning industry revenues are

What is your planned rate of change in IT spending over the next year?



expected to grow by more than six-fold by 2025.

The following venture capital firm is an example of the success that following the trend of digitization and big data can bring.

## Motherbrain—EQT Ventures

EQT Ventures, a Swedish private equity firm, is an example of the success that confidence in digitized methods can bring. They have expertly used a newly developed software called Motherbrain to lead the investment decisions in their venture capital wing. In 2017, they used the software to make 20 investments, most of which focused on the industrial, consumer goods,

technology and health care industries. The firm has closed more than 30% of its investment deals based on the software's results and has raised an impressive \$50 billion of capital across 27 funds. Unlike most other firms around the world, their portfolio was raised upon the connections found by machine learning technology.

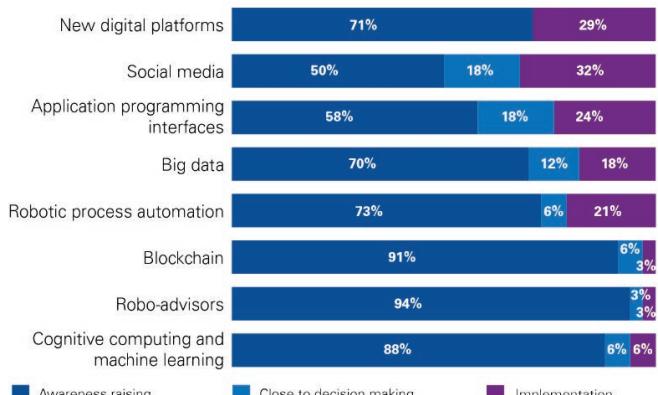
## How it Works

The machine learning software works by identifying a trend within startups and using it to label them as either high or low growth potential. The software analyzes several time series—a set of data points indexed over time—of the startup's financial performances and attempts to match them with the times series of successful companies. The more similar the data, the higher chance of success and more inclination to invest. Likewise, trends matching those of companies that experienced failure or had less success indicates lower growth potential.

As EQT feeds Motherbrain with data from its own and external investments, the software's algorithms will continue developing a better understanding of the trends that led to the success of the

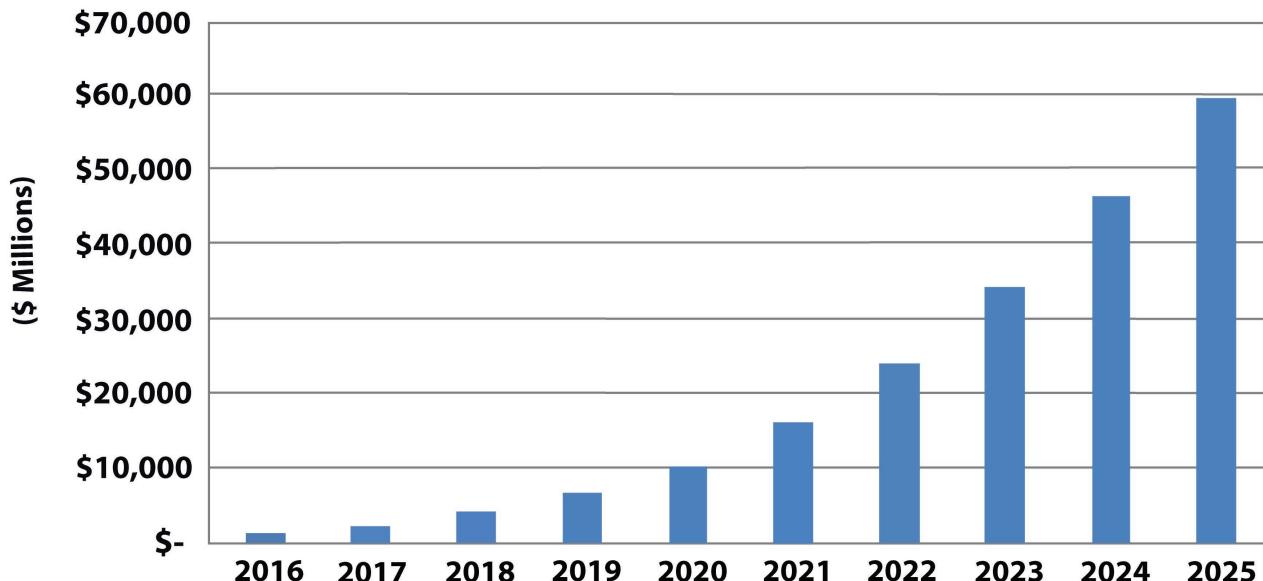
### Exhibit 1: Where do private equity firms stand in their journey?

Most surveyed firms are still in the "awareness raising" phase with respect to the eight key digital innovations.



Source: © KPMG/CREATE – Research survey 2018.

## Artificial Intelligence Revenue, World Markets: 2016-2025



surveyed companies. The longer and more often Motherbrain is used, the more capable its algorithms become in differentiating between high and low growth potential startups.

### Big Data Makes Big Results

EQT initially trained the software using data from their own successful investments found through traditional methods. Since then, the focus has been compiling financial data, including past funding, web ranking, app ranking, social network activity, and much more to add to Motherbrain's data base for its ever-improving algorithms.

Motherbrain does not only find new companies for EQT. Its capabilities extend to providing EQT's clients with data on the external analysis of companies. Some examples include:

- The effects that the behavior of competitors have on the sales/feasibility of a project

- The correlation between location and sales of a store location
- The effect that competitor sales in the market may have on the performance of the company
- The following mobile gaming startup is an excellent example of how Motherbrain had supported an investment deal

Small Giant Games, a mobile gaming startup based in Finland, was identified by Motherbrain in 2017 after EQT performed an analysis on the mobile gaming industry in Europe. Just ten months after EQT agreed to provide the startup with \$5.7 million in Series A funding, the company's revenue grew by an astonishing \$33 million. Due to the promising results, EQT has returned to Small Giant's owners and are discussing a second investment deal of \$41 million.

Provided the data, Motherbrain can guide a company all the way from its startup stages to becoming a major

corporation. It may sound like the software can hand EQT's investment deals to them on a silver platter, but the truth is far from it. As with any technology, it has flaws.

### Gut Feeling vs. Data Analytics

Motherbrain can process huge amounts of data. The more the program runs, the more accurate its predictions become. But not all data sets are accurate, complete or available for the software to use; thus, there will be gaps in the calculations of the software, creating skewed results. For example, Motherbrain has a more difficult time analyzing emerging tech industries. Its method of comparing time series to other successful companies is less effective as there is not much data yet on established companies in the growing industry.

There are also types of variable data that cannot be easily inputted into the software. Key parts of a

startup such as strong team dynamics, body language and the motivations of the owners are all determining factors in the success of the company but cannot easily be quantified into an acceptable form of data for Motherbrain to use. Whether firms are digitized or not, traditional networking and learning the motivations of executives within the industry remain of paramount importance to the success of the firm. EQT's deal with Small Giant Games highlights the value of these areas.

After Motherbrain identified Small Giant Games, EQT analyst Lars Jörnow met with the CEO of the gaming startup to discuss the direction of their new releases. After considering the respective customer segments, Small Giant Games decided to change their genre from casual to midcore games. Although the decision of marketing towards a new audience seemed risky, Lars wrote in his Medium article that he was "intrigued by the team's ambition to mix this evergreen core game mechanic with a deeper metagame". Their strong team dynamics and motivation indicated that this company, which already had the performance to be labelled as high growth potential, would be a worthwhile investment and connection in the industry. After the meeting, the two kept in touch and the Series A investment deal was eventually finalized.

A fully digitized firm's practices would not be perfect. Due to the limitations of data input, networking and learning about the management team of a company provides valuable insight that a software's programs cannot.

## So, Which One? Traditional or Digitized?

Both the digitized and traditional firms can operate feasibly, but question remains. Which method can bring a firm higher return, lower risk and more success overall?

The truth is, depending on the size of the firm's network, any method could be effective. Cutting-edge software like Motherbrain has proven to enhance deal sourcing and client interaction, but a strong network of connections is also important to the process.

The limitations of both methods are clear. Machine learning, although powerful, cannot cover the qualitative aspects of the company. However, solely using networking to source deals limits the amount of companies that a firm can analyze. Considering these factors and the modern capabilities of machine learning technology, a mixture of both digitized and traditional methods of investment appears to be the best way to approach an investment deal. Hendrick Landgren, a VP at Spotify before joining EQT Ventures, puts it best:

*"To build models where you can find great companies is great, but it's not as if you just press a button and then you have the investment. "It requires much, much more work." Much of that work is in the traditional investor realm of building relationships. "It's about knowing which relationships to build and when. "That's what we use Motherbrain for."*



# How Machine Learning and Big Data is Changing the Future of Credit Risk Management

Josh Mackenzie

Ever since the financial crisis in 2008, banks around the world have put a more significant emphasis on risk management systems in the effort to reduce the chances of another global economic recession. From these systems, credit risk was one of the main sub-causes of the 2008 financial crisis which became of great importance. To a bank, whether a client can pay what they are borrowing is the difference between making a profit from interest or otherwise having to liquidate the client's assets or even lose the loan entirely. As a result, finding ways to analyze creditworthiness and making smart risk management decisions is a top priority for the banks. By utilizing big data and machine learning the financial institutions can calculate the risks on loans and other financial transactions to a much greater degree, which in turn will help alleviate the overall risks the banks take with customers money.

One of the complications when it comes to assessing credit risk is the inefficient management of data stemming from a large amount of information. Furthermore, in countries such as China where there is little or no past credit information, lenders are virtually blind to customers spending habits. These can make analyzing credit decisions extremely

difficult for the lenders and can lead to an increase in defaulted loans. Machine learning algorithms and Big Data are at the forefront of combatting this problem.

Big data is a relatively new concept that can improve the overall accuracy of machine learning in the risk management environment by increasing the predictive potential of risk models. Furthermore, banks can take advantage of the big data to help detect the signals of fraud leading a reduced number of illegal transactions. This is done with a combination of big data and machine learning. By analyzing the spending habits of a person's past, machine learning can more accurately predict if the actual customer is making a transaction or if it is fraudulent in nature. For example, if your family has a history of taking trips during a particular time of the year, a pattern will be established that, in turn, will make it less likely to come up as a fraudulent charge when you book an out of country trip.

On the other hand, the banks can leverage machine learning to help increase the accuracy and efficiency of many daily processes. For example, quantitative hedge funds such as Two Sigma rely on machine learning every single day. The fund leverages machine learning to help find new investment opportunities that otherwise wouldn't be spotted by a person. Machine learning and big data have allowed Two Sigma to analyze over 10,000 data sources to find market patterns that influence investment decisions. All of these applications help increase the accuracy and efficiency of daily processes in a hedge fund.

However, how does this relatively new tech help deal with and strive towards eliminating credit risk? This can be solved by leveraging machine learning to analyze data that humans either couldn't or simply wouldn't examine before. Take for example a customer with very little or no prior experience in the world of getting a loan; usually, this person is a very risky asset to a bank. Nothing is known about his or her spending habits, or their ability to pay back a potential loan. This problem can easily be solved by implementing and managing this new customer's information with machine learning. By adopting this tech into daily use, the bank can track and record the potential lender's daily credit and debit transactions. In other words, are they bringing in enough capital to fully justify a loan of a certain amount? Over a period, the program that is learning from this data can make calculated predictions as to whether the potential lender has the capability to take on the loan.

Furthermore, it will also be able to come up with the risk that the bank

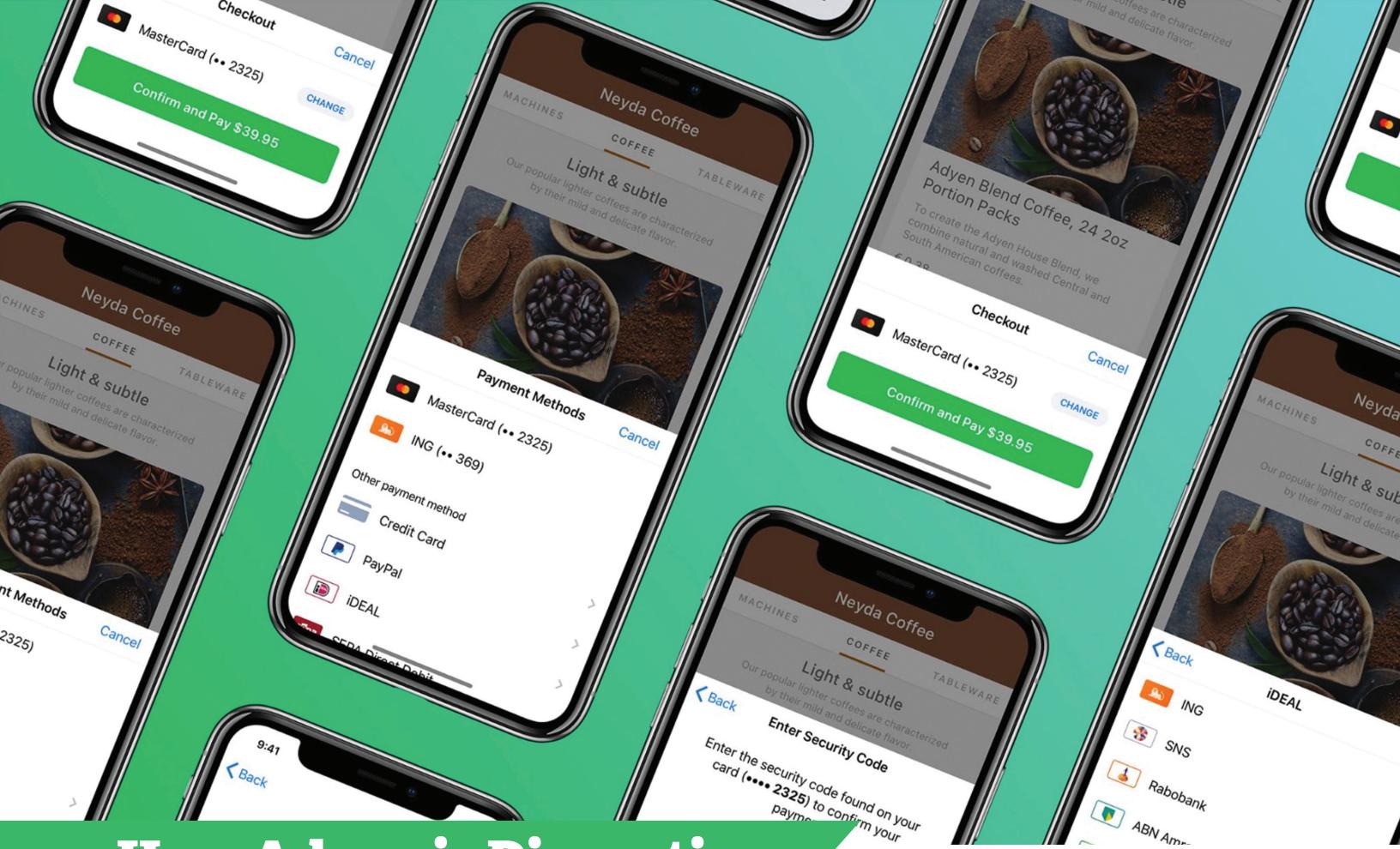
incurs while giving this loan. Essentially, if we do offer this individual credit for a certain amount of money, what's the risk that we bear? Through machine learning, all these questions can be answered.

A great example of this is FinTech startup ZestFinance. Founded in 2009, ZestFinance has been at the forefront of using Machine learning to help reduce credit risk for banks and lending institutions. Currently, the startup is using machine learning in a variety of different scenarios including auto financing, consumer lending, and mortgage lending with staggering results. In auto lending, both losses and default rates have been reduced by 20% or more on average. In consumer lending, loan defaults have dropped while more people are being approved for loans. Finally, in Mortgage loans, losses and default rates have decreased by more than 30% on average, and loan approvals have increased by nearly 15%. All of these improvements lead to a safer and less risky investment for financial institutions and can, therefore, help reduce the likelihood of another financial market meltdown that could be partially caused by unneeded credit risks.

Improvements to machine learning in recent years have led to many financial institutions leveraging machine learning to produce not only higher returns but also less risk on investments. This includes firms implementing high-frequency trading desks that leverage machine learning to help make trading decisions in a fraction of the time it would take a person. Alongside this, many more user-oriented financial tools have become available with the help of machine learning. These include services such as robo-advisory,

fraud detection technologies, and insurance underwriting. All of these services would be much more difficult, if not impossible without machine learning.

Based on the evidence presented above it can be deduced that leveraging machine learning for various uses including risk management can only stand to benefit banks. This, in turn, helps both you and me as the users of financial institutions. With most banks either looking at adopting this technology in the near future or already using it currently, we as the consumers can benefit from lower rates on loans and an improved sense of security that our bank will stay solvent. Having machine learning in financial institutions will also reduce the chance of future economic disasters caused by lapses in human judgement such as the 2008 financial crisis. Although applications of machine learning and big data will never be able to completely mitigate the potential risks that stem from lending to risky clients, it is a significant step in the right direction that will help reduce future financial losses and possible disasters.



## How Adyen is Disrupting Payment Processing

# adyen

Connor Childs, Stefan  
Shen, Judy Song, Nick Vukelic

As multinational companies embrace omni-channel sales strategies and enter global markets, they must ask themselves the following question: how will we accept payment? Take Nike—an omni-channel firm selling products around the world. They face two primary issues. First, Nike's global Point-of-Sale (POS) system is fragmented among many intermediaries: different payment gateways, service providers, acquirers, and processors. This structure inherently increases costs

as fees are paid to each intermediary in the process. Additionally, it is challenging to create a single view of their customer since they must consolidate payment data from brick-and-mortar, online, and mobile providers. Second, consumer payment preferences around the world differ, meaning Nike must work with a new set of intermediaries for every different geography and form of payment the customer would like to use (e.g., Visa, Alipay, Giropay).

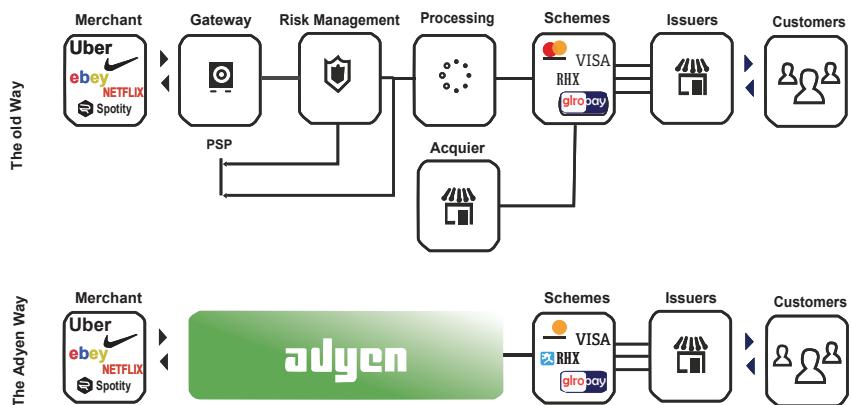
This complex, global distribution channel means more vendor contracts, more system and process integrations, and ultimately, higher costs.

In 2015, Nike chose Adyen as their payments processor to solve these problems. Adyen is a payment gateway, service provider, acquirer, and processor for online and brick-and-mortar commerce. Adyen requires only one system, one process integration, and one contract for a multinational enterprise to serve customers in 150+ countries and to accept 200+ methods of payment.

The global market for payment processing is massive, with US\$1.6 trillion in total addressable market revenues. Payment revenue is expected to grow at a CAGR of 7% through to 2021. Adyen has plenty of room to grow, as growth of 1% in Adyen's market share will lead to

an additional US\$1.6 billion dollars of revenue.

This massive payments industry has traditionally supported many intermediaries, which Adyen has disrupted.



Adyen's primary competitors include the likes of PayPal, Worldpay, and Stripe. Adyen caters to big, international operations while Stripe targets the startup app developer community, making up for lower volume by charging a slightly higher margin. Adyen's transaction volume last year in 2017 was \$130 billion, while net revenue grew to \$262 million. The company grosses less than 1% of every dollar processed, far below the 2% to 3% that Worldpay, PayPal and Stripe make.

method fee per transaction. The processing fee is a fixed amount collected by Adyen, \$0.12 in North America, Asia Pacific, Latin America and €0.10 in Europe. Depending on the payment method, an additional fee is charged specific to the

businesses with international card networks and local payment methods alike.

Schuijff and van der Does funded Adyen after they sold their previous startup, Babit, which was a billing platform for small amounts of content, to the Royal Bank of Scotland. The partners began bootstrapping Adyen where they focused on building the platform and closing deals. In June 2014, Adyen raised \$16M to help fund its expansion into the US. Six months later, in December 2014, Adyen raised an additional \$250M in Series B funding led by General Atlantic, which valued the company at \$1.5B. In September 2015, it was reported that Iconiq Capital, a privately-held investment firm, agreed to add funds to Adyen which valued the company at \$2.3B, but no numbers were ever released.

In June 2018, Adyen went public on the Euronext with an implied market capitalization of €7.1B based on the current capital structure and the private shares previously issued. As of November 2018, Adyen share price has more than doubled and has a market value of €16.7B.

Adyen has been extremely successful to-date. In the first half of 2018, they processed €70B worth of transactions which was up 43% from the same period in 2017.

Adyen has acquired B2B customers from top retail brands to tech giants: Tiffany & Co., Uber, Netflix, and easyJet. For retailers like Nike who process both physical and online sales, Adyen allows them to maximize the advantage of omnichannel retailing, by processing payments underneath one system.

interchange fee charged by the issuing bank, scheme fee charged by the card scheme, and applicable acquirer markup. These fees are clearly outlined on their website and can be predicted by merchants before the transaction is executed.

### How is Adyen different?

Pieter van der Does, CEO, and Arnout Schuijff, CTO, founded Adyen in 2006 along with some other entrepreneurs. Believing that the current payments technology was outdated, they set out to create

	Adyen	PayPal	Stripe	Worldpay
Price	Inter change plus+ 0.12USD	2.9%+0.30USD (in US); 4.4%+fixed fee based on currncry (outside us)	2.9%+0.30 USD	2.75%+ £0.20
# of Transactions (Billions)	3.7	7.6	NA	40
Total Transaction Volume (\$Billions)	130	451	50	1500
Countries	100+	200+	26	146

One of Adyen's propositions is transparent fees. They provide a full list of prices for supported payment methods on their website. Adyen charges a processing plus payment

something that could better serve our rapidly globalizing world. They named the business Adyen, which means "start over again" in Surinamese, and decided to build a FinTech that could connect

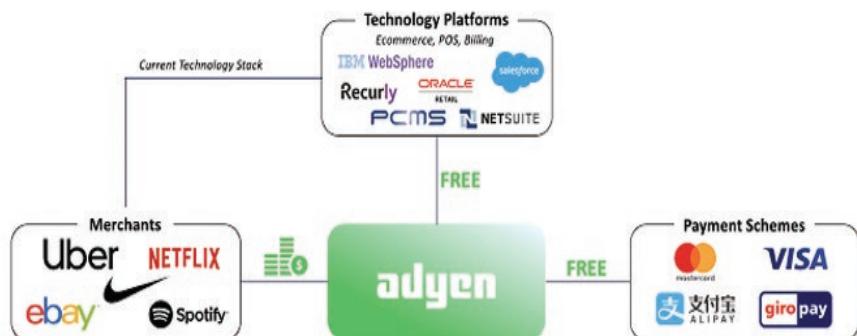
One of Adyen's biggest advantages is that it acts as a global platform with direct connections to international cards, enabling 'plug and play' expansion to new regions. Moreover, Adyen is equipped with local payment methods and expertise as preferred payment methods are different around the world, such as Alipay in China, which accounts for 65% of online payments. Adyen's wide geographic reach and experience at scale extends to more than 150 currencies and over 200 methods of payment. Adyen delivers unified commerce across countries and channels—online, mobile and in-store. Merchants have access to centralized consumer data and are able to manage all payments across channels and countries with one integration, one backend, and one contract.

Additionally, Adyen aggregates payment data to offer consumer insights to merchants, which is crucial to CRM. Also, Adyen has a fully built in-house risk management system, meaning merchants can outsource all their security and regulatory compliance issues. Adyen provides fraud protection over all payment methods, not limited to cards. Furthermore, to bolster its efforts to reduce potential risks, Adyen uses data and machine learning in its payment routing, optimizing authorization rates. Its growing data set and initial investment in data science infrastructure allows for potential quick extensions into other data-driven products and services in the future. By integrating gateway, risk management and processing & acquiring processes all into one platform, Adyen presents these key benefits: global reach, unified commerce and centralized data.

All software development, administration, networking, database management, and security is done in-house. Their systems are designed for maximum uptime through a redundant and stateless service-oriented architecture (SOA) that accepts payments simultaneously on multiple hosting locations. Currently, Adyen manages all their own servers, and hosts its main system in data centres in Europe and the US. They do not outsource any operations as they want to ensure the highest standards of security, integrity, and stability by retaining full control of their components.

Adyen is a multi-sided platform that exclusively charges merchants. The value to merchants is derived from the partnerships they have formed with card schemes, as well as the technology platforms. Adyen has partnered with popular Ecommerce, Billing, and POS platforms to ensure their 'plug-and-play' solution will integrate seamlessly into the technology stack of their merchant customers.

improves its products with regular software updates every four weeks to ensure that they stay competitive with the competition and extend their product offering. With their existing scalable business model, Adyen should focus on developing partnerships with merchants in countries like China and India where the growth of E-commerce is highest. While the outlook within the B2C payments space is positive, Adyen should consider adjacent industries moving forward. A key differentiator in the market is their relationships with card schemes around the world. Should Adyen enter the C2C payments market to leverage this capability, tap into a new revenue stream, and further develop consumer insights? Only time will tell.



## How Will Adyen Continue to be Successful?

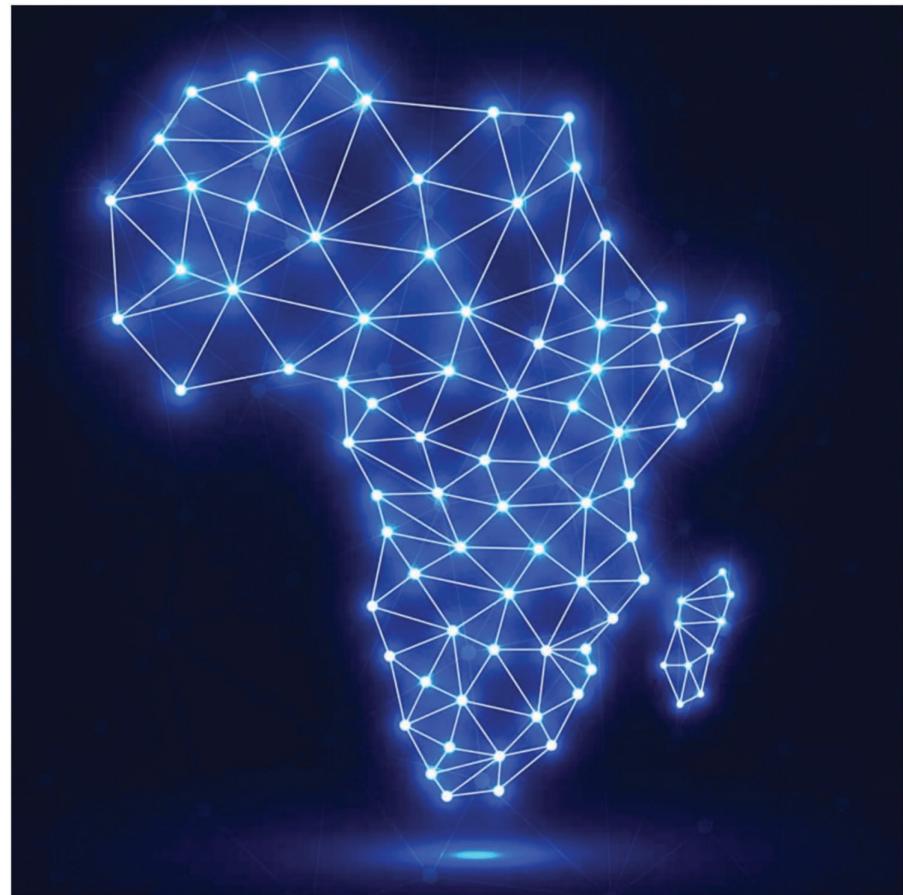
Adyen is focused on providing their merchants with the best payment experience by constantly innovating. Adyen continuously

# Africa's Mobile Banking Revolution

James Engel

It is common knowledge that one of the essential parts of a modern economy is a robust and sophisticated financial system. All economies are faced with the same pair of problems: consumers want a way to invest their savings and passively generate wealth, while businesses need access to capital through loans and equity in order to operate and grow. Financial institutions solve these problems by distributing a population's accumulated savings to firms and individuals that need it in order to generate a return, all the while reducing the risks to those on both sides of the transaction. A successful system of saving and investing is the engine powering an economy's growth. It is in fact the heart of economy, working to pump liquid blood (or capital) to the organs that need it. However, when the heart is weak or altogether absent, organs cannot operate to their full potential. They necrotize and fail, or at the very least exist in a greatly reduced capacity. And this necrosis is in a large part responsible for Africa's historical economic stagnation. As of 2014, the World Bank records that 66% of Sub-Saharan Africans did not possess a bank account. These 600,000,000 people do not have the ability to invest their savings, and instead their wealth stagnates away from the capital starved economies that desperately need it. But that may be about to change, thanks to a group of new firms that seek to use new technology to solve an old problem.

This is the story of Africa's nascent mobile banking and payments firms, which seek to leverage the



technology that has driven the "mobilization" of banking to finally break into the continent's vast unbanked population. To them, the state of the "unbanked continent" is not an obstacle but a massive opportunity. Where as more economically developed countries gradually evolved from in person tellers to automated teller machines in the 1970s to computer banking in the 1990s to phone banking in the 2000s to mobile banking today, Sub-Saharan Africa has the unique option to "leapfrog" redundant technologies that were never feasible and jump right from the 1960s to the 2020s. This will allow the region's financial institutions to

perform on a similar level with those of developed nations, allowing the economy as a whole to catch up.

## M-Pesa

The forerunner for these mobile banking firms is M-Pesa. M-Pesa is unique in that it defies the ideas that are typically associated with disruption; instead of being a sleek, venture-capital backed tech startup it is owned and operated by the African subsidiary of the venerable London-based telecommunications giant Vodafone. In the early 2000s, Telecomms companies identified that, due to a lack of access to traditional banking, individuals would often transfer prepaid airtime

to each other in lieu of actual currency, and would then either use or resell it. Realizing that the “airtime banking” system suggested a massive opportunity for whoever could create a workable legitimate mobile payment system, Vodafone’s African subsidiary Safaricom did just that, creating M-Pesa. Starting in Kenya, the network reached 1.2 million customers in its first year, now serving 30 million across Sub-Saharan Africa. The service proved to be incredibly popular among not just airtime bankers but among a general population for who had both been unbanked and had lacked the ability to transfer wealth. In Kenya, as is in many developing economies, the breadwinner of a family often travels to urban areas for work while their family stays behind, and a negative side effect of the lack of financial institutions was the difficulty breadwinners had with transferring money home, many resorting to traveling for days just to deliver cash or riskier methods such as mailing the money or giving it to a bus driver. Thus, M-Pesa’s branchless banking system not only allowed for greater savings and investment but also made the transfer of money easier, and safer, allowing hundred-mile transactions to occur with the tap of a smartphone.

### The New Wave

Today, FinTech is Africa’s most funded startup sector. One of the most prominent startups in the field is Paystack, a Nigerian Mobile Network Operator startup, focuses on facilitating convenient transactions between merchants and the debit and credit cards of their customers. It does this by creating a fully integrated payment transfer API, which, put simply, streamlines the numerous processes that must take place for money to transfer between

individuals, allowing transactions that previously would take hours or days can now be verified in seconds. Furthermore, Paystack’s payment system is designed to be convenient and easy for merchants to set up, with an emphasis on the service not just as equipment but as a good consumer experience. Paystack is currently backed by Stripe, Visa, Tencent and Y Combinator and recently rose \$8M in funding as it seeks to expand out of its native Nigeria.

The roughly one billion people living in Sub-Saharan Africa are, unlike each billion living in the developing economies of China and India, divided among 46 countries, each of which has their own currency, monetary policy, border restrictions and tax laws. This has been one of the main challenges faced by those hoping to mobilize the continent’s finances. Flutterwave, and its main service Moneywave, offer a solution: an API layer that, for a relatively small flat fee, automatically converts transactions to preferred currencies. This removes the need for complicated financial structures, such as having firms manage separate accounts for each currency they may potentially receive or be billed, reducing cost and account management work. In 2017 14 new African FinTech firms received funding, and, though they are in much earlier stages and not all of them will succeed, they will undoubtedly make an impact on business in the continent.

### The Future

Though it has clearly identified potential, the mobile payments industry is still in its early stages. Most firms are startups that have only received Series A funding if any at all. In Sub-Saharan Africa 12% of the population currently uses a mobile payment provider, and while

this is far ahead of the global total of 2%, the future of banking in the region will be determined by how and which firms expand thus portion. The market for mobile banking will almost certainly expand greatly, and then it will be up to those firms that succeeded to consolidate and compete to be the go-to financial institutions in Africa. This will have far reaching positive effects on the continent’s economic future: blood will be delivered to the organs that have needed it all this time. Additionally, the mobile banking revolution will lead to a more integrated continent where changes of currency, great distance and national borders can no longer stymie business and growth. The increased ease of investment will also increase the number of locally funded startups in the region, as the immobility of capital that has characterized the region has caused these startups, including, ironically, mobile payments startups, to be totally reliant on investment from Europe, America and China. In the end, it is hard to underestimate the potential impact of this technology; and how important it is to understand it if one wants to understand the societal transformation in Africa’s future.

# Quantum Computing: The Future of the Financial Industry

Danylo Kravets



Imagine the computer and all of the electronics you use on a daily basis, whether it's to get a project done, delve deep into a podcast you've been catching up on, or even monitoring your personal stock portfolio. All of these applications are governed by two specific values at very high speeds: 0's and 1's. Now imagine a computer that is not restricted by the limit of only two binary states; a computer that can operate using orders of magnitude and more states as its fundamental building block, with an ability to process and change these states at the same time. Instead of using binary to encode and transfer information, quantum computers utilize quantum and physical phenomenon such as superposition, interference, entanglement and annealing to manipulate information and solve computational problems using these so-called quantum bits or qubits. While traditional systems can only encode data in binary with two definite states, quantum

mechanics allows for information in qubits to be in superpositions of states which allows for these systems to solve current problems that are unsolvable with current technology because of the lack in computational power traditional systems have. Even though quantum systems are still in the early stages of their development, and adoption within the financial industry being ten or more years out, that doesn't stop us from predetermining useful applications of these systems once they become more mainstream.

Capital markets become an interesting topic when discussing the potential of quantum computing because the movement of capital is often driven by individuals seeking to minimize their overall risk and maximize their returns. As individuals, we all want computers to be able to speed up the analysis of these situations. This has created a computational race within the industry in which quantum

computing will revolutionize, especially in topics such as optimization of portfolios and a more effective and efficient method of pricing derivatives.

One current issue in the world of the capital markets is the proper optimization of a portfolio to mitigate the most risk while retaining the greatest possible amount of return. With current technology, it is very difficult to efficiently determine an optimal portfolio due to so many parameters and constraints changing frequently over time and the many potential investment strategies which classifies it as an NP-hard problem. In simple terms, an NP-hard problem is known as a non-deterministic polynomial time, where many non-linear optimization and search algorithms fall under. In NP-hard algorithms the execution time cannot be predicted using polynomial or exponential laws because of the very large size and the diversity of the input parameters which makes such algorithms very computationally expensive. Considering the fact that the markets change every second and can be unpredictable, quantum algorithms will allow us to properly optimize for the future through a more effective quantitative method.

Another known problem in optimization is finding global solution versus local solution.

To put this concept of optimization into perspective, think of a 3D landscape with many valleys and mountains. If a regular computer wanted to find the solution to the problem of locating the lowest point in the landscape, it would have to test each point against another individually, until it found the optimal

values. Now imagine how much more difficult it would become when we cross into multidimensional problems. While many methods and algorithms have been developed, all of them require using different degrees of “brute force” search that is a very computationally expensive process in multidimensional space.

## Quantum Annealing Applications

Quantum annealing uses various phenomena like quantum qubits, energy states, state superpositions, and quantum entanglement by integrating them into a single computational unit. This allows the problem to be formulated by configuring qubits and their interconnections, using quantum annealing to converge the entire quantum network to its lowest energy state. When the annealer finishes and all qubits in the quantum network settle, the final states of each quantum qubit will represent the answer to the initial problem in its lowest energy point – the global minimum (our desired answer). While we already mentioned how standard computers would handle the 3D landscape, an annealer would create a direct tunnel that cuts through all mountains and valleys directly to the best answer. For a bulge bracket bank like Barclays, they already have began to experiment with quantum programs on IBM's quantum cloud to gain a sustainable competitive advantage. Barclays hopes to see improvements in the optimization of large transactions that have varying levels of collateral, credit and constraints when it comes to asset liquidity. These large transactions are usually never instantaneous which creates inefficiencies in transactions that need to be processed quickly, which is where quantum computing aims to step in.

Someone may argue that a similar approach can be programmed

using traditional methods and using traditional computers. While somewhat true for simple problems, this process becomes significantly more time consuming and difficult when you introduce functions with thousands or more highly dynamic and random parameters that constantly change over a short period of time. Quantum annealing will allow researchers to delve deeper into potential applications within the financial industry, such as creating more efficient arbitrage opportunities and finding the best way to execute large trades against the market in a more precise and efficient manner.

## Monte Carlo Methods and Derivatives

Quantum computing also has future promise in utilizing Monte Carlo methods to handle the pricing of derivatives with complexities and many uncertainties through a varied risk valuation. Traditionally, derivatives have been priced through the Black-Scholes equation, a model which makes the assumption that certain subclasses of assets such as derivatives follow geometric Brownian motion with a constant volatility and drift. This changes with Monte Carlo methods in mathematics, using random numeric sampling to map out many possible future price points with unique inputs.

Monte Carlo methods reduce the uncertainty of an outcome by allowing the individual controlling the algorithm to visualize many risk assumptions under different parameters and therefore use the model to predict potential future price points. The downside to the Monte Carlo model and why we are not currently using it is because of the amount of time it takes to generate and test all of these random values against each other, as well as potential issues in sampling bias. With current technology, Monte Carlo is nowhere

near as fast or convenient relative to the current models, as the Black-Scholes equation utilizes predetermined parameters with set values compared to a fully randomized sample. Quantum computers help solve this problem by computing random sampling calculations at an astronomically faster rate than current state of the art technology.

## Final Thoughts

Overall, I have a firm belief that quantum computing will be the future of the financial industry within the next five to ten years. Even though current application has not been fully realized yet due to the infancy of the industry and because it is only feasible for smaller calculations that can properly be expressed, that shouldn't stop people from coming up with new solutions to currently existing problems through the promising future technology. While institutions that invest ample time and resources may reap its future benefits among the industry, there is still one lingering question: will average consumers like you or I ever transition to quantum computers as personal devices in the future? We'll have to see.

# What is a Bitcoin ETF and Why Does it Matter?

David Mirynech, Jack West



January 4th, 2019 marked ten years since the first transaction occurred on the Bitcoin network. In that period of time bitcoin and its markets have experienced many developments. From a small group of cyber-phunks, computer science and hacker hobbyists, anarchists and the like, bitcoin as an asset class has recently attracted attention from a growing number of asset managers, financial institutions, governments, and even the general public.

The increase in attention has led bitcoin to become the best performing asset of the last decade with the price of one bitcoin experiencing a high of \$19,783.06 on December 17th, 2017. While the asset has since lost much of this value, what cannot be denied is the growing maturation of this market as a whole. In fact, interest from Wall Street and other financial institutions has reached such a point that there is a growing contingent of groups pushing to have the Securities Exchange

Commission (SEC) and the Commodities Futures Trading Commission (CFTC) approve the application of a bitcoin exchange-traded fund or ETF. The coming of a Bitcoin ETF might be one of the most talked about developments in the industry as a whole due to the effects it will have on bitcoin trading at large and what it says about the current state of the market.

Furthermore, not all parties believe that the approval of an ETF is in the best interests for the asset class.

## In Favour of the ETF

Much of the camp in favour of the bitcoin ETF comes from traditional finance. JP Morgan has openly said "A Bitcoin ETF is the holy grail for owners and investors." A Bitcoin ETF paves the way for large financial institutions to enter the asset class because ETF's are cash settled and do not have to be traded through bitcoin. Think about the product as an "I O U" that is representative of bitcoin the digital

asset. As a result, these firms as well as investors do not have to deal with the complexity of wallets and private keys. Funds are held in custody by large asset managers like Fidelity, who has just recently launched a separate entity known as Fidelity Digital Assets, or by other institutional grade custodial options like BitGo. These stakeholders provide high degrees of security and do so in a manner compliant with federal regulations. ETF markets are highly regulated and mature, which would bring an air of stability and legitimacy to trading, improving the general perception of the asset class as a whole.

In addition, all ETFs are fully insured by law protecting investors from counterparty risk or hack. These regulations have pricing standards through set indices that should prevent any attempts at manipulation, eliminating so called 'pump and dumps.' The introduction of 'smart institutional money' should also help curb speculation in the market leading to greater efficiency. Finally, if Gold ETFs are any indicator, many analysts believe we could see over \$1 billion in attention on the first day of trading.

There are many organizations attempting to win the race to list the first bitcoin ETF, and one of the leading horses in this race is VanEck, an asset management firm with over 60 years of experience, known for developing some of the first ETFs as well as one for gold in particular.

**Table 6: Bitcoin ETFs Pending Approval**

Table	Filing Date	Underlying	Status
Winklevoss Bitcoin Trust ETF	Jul-13	Bitcoin	Denied, but Appealing
Bitcoin Investment Trust ETF	Mar-16	Bitcoin	Withdrawn
Ether ETF	Jul-16	Ether	Awaiting Approval
VanEck Vectors Bitcoin Strategy ETF	Aug-17	Bitcoin Futures/Funds	Withdrawn
Rex Bitcoin Strategy ETF	Aug-17	Bitcoin Futures	Withdrawn
Rex Short Bitcoin Strategy ETF	Aug-17	Bitcoin Futures	Withdrawn
ProShares Bitcoin ETF	Sep-17	Bitcoin Futures	Withdrawn
ProShares Short Bitcoin ETF	Sep-17	Bitcoin Futures	Withdrawn
Evolve Bitcoin ETF (Canada)	Sep-17	Bitcoin Futures	Awaiting Approval
First Trust Bitcoin ETF	Dec-17	Bitcoin Futures	Awaiting Approval
Direxion Bitcoin ETF	Dec-17	Bitcoin Futures	Withdrawn
GrainShares Bitcoin ETF	Dec-17	Bitcoin Futures	Awaiting Approval
GrainShares Short Bitcoin ETF	Dec-17	Bitcoin Futures	Awaiting Approval
Direxion Daily Bitcoin 1.25x Bull ETF	Jan-18	Bitcoin Futures	Awaiting Approval
Direxion Daily Bitcoin 1.5x Bull ETF	Jan-18	Bitcoin Futures	Awaiting Approval
Direxion Daily Bitcoin 2x Bull ETF	Jan-18	Bitcoin Futures	Awaiting Approval
Direxion Daily Bitcoin 1x Bear ETF	Jan-18	Bitcoin Futures	Awaiting Approval
Drexion Daily Bitcoin 2x Bear ETF	Jan-18	Bitcoin Futures	Awaiting Approval

Source: Bloomberg and Company Filings

## REGULATORY ISSUES

Nevertheless, if bitcoin has been around for years it begs the question of what has taken so long for the emergence of an ETF if it does indeed provide this much value to the market as a whole. The SEC and CFTC have a multi-stage test to accept the trading of an ETF. The test mentions that markets first have to be considerably established in size, significant in volume, and regulated to provide a deterrent to price manipulation. In the regulators view, the bitcoin market did not meet this threshold in March 2017 and thus early attempts were denied.

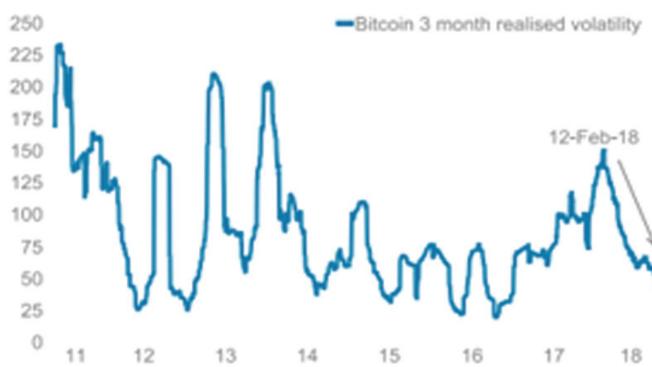
## BITCOIN MARKET MATURATION

After examining the slides from one of the SEC's most recent meetings on the subject with a Bitcoin ETF proposal backed by VanEck and SolidX, these firms described how the bitcoin market has developed in four significant ways in the last year to warrant an ETF product.

The first is that we now have derivatives, futures, swaps, and options on reputable exchanges like the Chicago Mercantile Exchange. These exchanges do about \$200M a day in trading volume for these futures.

The existence of these products are important because derivatives are proven to act as price stabilizers, limiting the volatility that has become synonymous with bitcoin. Recent research conducted by Morgan Stanley has demonstrated these products have lowered bitcoin's realized volatility showing signs of market maturation.

The second significant change is the use of an OTC index for pricing and net asset value. This means that the prices of these ETF products are not based on crypto exchanges which could be subject to manipulation, but rather are aggregated from Over-the-Counter (OTC) trading desks which serve large orders for financial institutions.

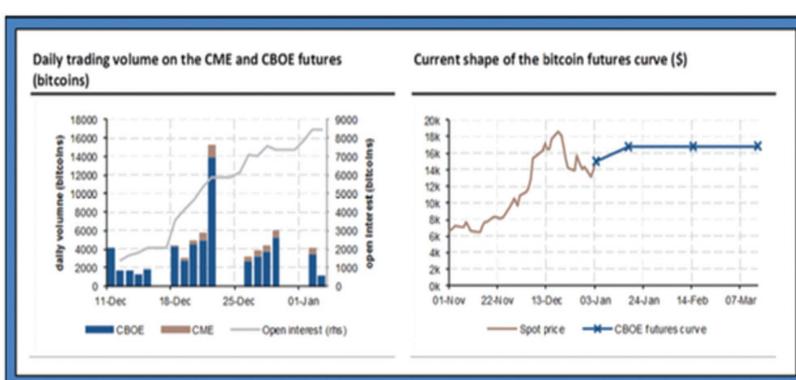


The result of using these financial standards and regulated indices means that price manipulation cannot occur unless undertaken by the OTC trading desk themselves, which would be unwise as they are under regulatory scrutiny of the CFTC in addition to the SEC. VanEck and SolidX argue that this increased oversight by two large regulatory bodies is another sign of a maturing market.

The third material change that SolidX has proposed includes the introduction of information sharing agreements between players like the exchanges trading derivatives, futures, and options as well as OTC desks leading to increased market transparency for all participants. This has since been supplemented by the news that the Nasdaq has been hired by Gemini, a firm operated by the Winklevoss twins, to conduct market surveillance.

The last change VanEck and SolidX state is within the ETF product itself. One large concern for the regulators when dealing with these new assets is investor protection.

Therefore, the SEC is hoping large institutions will invest in the ETF rather than retail investors. In order to ensure that 'sophisticated investors' are investing in



Sources: Bloomberg, SG Cross Asset Research/Commodities.

these products, VanEck and SolidX have structured the ETF as a 25-bitcoin basket (approximately \$100,000 minimum investment at current price). This will ensure that only accredited investors, or those who invest through a brokerage will be able to access these products because of price.

## OPPOSITION TO THE BITCOIN ETF

Despite the legitimacy and capital inflows that ETFs offer bitcoin as an asset class, many of bitcoin's original adopters are vehemently against the introduction of such a product. These differences arise primarily from ideological differences. Early adopters see the introduction of an ETF as Wall Street's rehypothecation of bitcoin. One of the allures of bitcoin as an asset class is that users own their own bitcoin through personal storage of their private keys. By creating an ETF, buyers are now asking a third party to store and custody these assets for institutions, a service that begins to look a lot like a bank for a product that was designed to disintermediate them.

Another contentious issue is that bitcoin is fundamentally deflationary as an asset class: there will only ever be 21 million BTC in circulation. If ETFs are not regulated properly, it is very possible issues could arise from financial institutions and markets for pledged collateral and securities lending to place more paper claims on bitcoin than there are actual assets. This results in the sort of 'financial engineering' that is characteristic of Wall Street and has proved detrimental in the past, a possibility that angers bitcoin purists.

## BITCOIN ETF APPROVAL

While the industry at large appears over anxious for a conclusion to the approval process, it is important to note that regulation takes time, and the SEC has proven through recent delays that they would rather make the right decision regarding a particular organizations proposal. While the VanEck and SolidX proposal is considered to be the most compelling in the eyes of industry experts, the SEC has delayed the decision regarding this proposal until February 27, 2019. The approval of a bitcoin ETF would represent a fundamental change in the market, as it would significantly increase the capital injected into the asset class through this investment vehicle.

Despite the negative price performance of bitcoin and other cryptocurrencies in 2018, this past year has been the most active year for the industry, as it saw significant progress in strengthening the infrastructure supporting the asset class. The importance of the ETF is derived not just from the passing of the product itself, but rather the SEC and CFTC recognizing the industry as maturing.

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## EXECUTIVE TEAM

**CONNOR HUTCHISON**, CO-PRESIDENT  
[chutchison.hba2020@ivey.ca](mailto:chutchison.hba2020@ivey.ca)

**DAVID MIRYNECH**, CO-PRESIDENT  
[dmirynech.hba2019@ivey.ca](mailto:dmirynech.hba2019@ivey.ca)

**JACK WEST**, CO-HEAD OF RESEARCH  
[jwest.hba2019@ivey.ca](mailto:jwest.hba2019@ivey.ca)

**ARIELLE LUDER**, CO-HEAD OF RESEARCH  
[aluder.hba2019@ivey.ca](mailto:aluder.hba2019@ivey.ca)

## EDITORIAL BOARD

**FRANK WANG**  
[fwang.hba2019@uwo.ca](mailto:fwang.hba2019@uwo.ca)

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[kpatel.hba2019@ivey.ca](mailto:kpatel.hba2019@ivey.ca)

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[schen869@uwo.ca](mailto:schen869@uwo.ca)

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[ezhu.hba2020@ivey.ca](mailto:ezhu.hba2020@ivey.ca)

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[mclemmiss@uwo.ca](mailto:mclemmiss@uwo.ca)

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[fbasharu@uwo.ca](mailto:fbasharu@uwo.ca)

**ANDY WANG**  
[qwang459@uwo.ca](mailto:qwang459@uwo.ca)

A photograph of a modern architectural structure during dusk or night. The upper portion of the building features a large glass facade with a grid pattern, reflecting the surrounding environment. Below this is a lower section made of light-colored stone or brick. A metal railing is visible on the left side. The sky above is dark.

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