

Cryptocurrencies and Blockchain Technology

Evaluating Risk and Regulation
in the Digital Currency Age

May 2019
White Paper

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1. Executive Summary

Financial Industry Trends in the Cryptocurrency and Blockchain Space

- In the global digital currency space, US and EU banks are ahead of peers, in regard to having already adopted or tested Blockchain and cryptocurrency-related use cases.
- International payments, settlement and clearing, and trade finance were the leading Blockchain use cases by major banks; crypto custody solutions were also being explored.

Cryptocurrency Use Cases and Challenges to Adoption

- With growing interest in cryptocurrency markets, traditional custodians have a new opportunity to offer third-party custody solutions for cryptocurrency assets, which could make it easier for more institutional capital to enter the crypto industry.
- With institutional investments in crypto assets reported to increase in the next five years, crypto derivative trading could be an increasingly attractive opportunity for financial institutions.
- Mainstream adoption of cryptocurrencies remains nascent, but interest in the crypto asset space by financial institutions is firm.
- There are a range of financial crime and regulatory risks which need to be considered and addressed during research and adoption of cryptocurrency products.
- 2019 has been a year of increasing regulatory scrutiny of the crypto industry around the globe, as regulators become more aware of growing risks to consumers and the potential for illicit activity.
- Countries are taking independent regulatory stances towards crypto assets. There has been little global coordination on cryptocurrency regulation, and a global standard does not exist.

Blockchain Use Cases and Challenges to Adoption

- Financial institutions have expressed interest in permissioned, enterprise blockchains to ensure more control over the users on the network and to make compliance with Anti-Money Laundering (AML) and Know Your Customer (KYC) laws easier; they are also becoming more engaged in blockchain projects through consortia.
- Blockchain is expected to disrupt the settlement and clearing process with faster settlement speeds, increased transparency, and lower costs, potentially saving capital markets \$6 million annually.
- Blockchain has the potential to reshape the syndicated loan and capital markets mainly by increasing efficiency and reducing costs. Banks can efficiently track services provided at various stages of the process, such as distribution of fees and charges in local syndicate banks.
- Despite growing investments in Blockchain technology, adoption has been mostly limited to use cases, as opposed to an institutionalized approach.
- Concerns about privacy, interoperability, scalability, and regulatory uncertainty are key barriers to widespread adoption of blockchain use cases in financial services.

PART I: INTRODUCTION

2. Report Background: Project Scope and Methods

Project Objectives and Scope

The purpose of this study is to weigh potential business opportunities and risks associated with cryptocurrencies and blockchain technology for financial institutions, all within the emerging regulatory environment. Discussions with key industry players and regulatory and compliance experts have helped the Columbia team to understand the current landscape of the cryptocurrency and blockchain markets.

More specifically, this white paper addresses four main research objectives:

- 1 Benchmarking adoption and highlighting trends in the digital currency and blockchain space by financial institutions
- 2 Identifying a select number of key use cases for the financial services industry and highlighting challenges, risks, and main players
- 3 Outlining the regulatory landscape on digital assets in the US and other select jurisdictions
- 4 Highlighting major risks from conducting business in the cryptocurrency industry, including money laundering, sanction evasions, terrorist financing, and fraud

The anonymous/pseudonymous nature of cryptocurrencies and different regulatory standards worldwide present a variety of financial crime considerations that are unique to cryptocurrencies. Therefore, this paper does not aim to provide an exhaustive list of risks, but instead focuses primarily on financial crime risks. Additionally, this research is mainly applicable to the US market, but a regulatory overview is presented for the EU, China, and Japan. Lastly, this paper does not address concerns about energy intensity and energy costs associated with blockchain technology.

Project Methods

This study aims to provide a range of adoption challenges, financial crime risks, and regulatory considerations for financial institutions making business decisions related to cryptocurrencies and blockchain investments. The following methodology was taken to achieve these outcomes:

- Conducted a literature review of key documents, reports, and research in the blockchain and cryptocurrency space to understand existing research;
- Conducted a review of the regulatory landscape in US and other countries engaging with the cryptocurrency and blockchain space, in order to select a select number of countries to spotlight;
- Conducted 27 interviews with representatives from financial institutions, financial technology companies, regulatory agencies, law firms, and consulting companies to assess existing evidence on the industry and get a broader range of perspectives on challenges, risks, and feasibility of use cases;

- Identified emerging trends in cryptocurrency products and blockchain use cases in financial services and selected six use cases based on the findings of the trend analysis;
- Synthesized findings from literature review and interviews to produce a final report.

The objective of the industry trend analysis is to benchmark the digital currency and blockchain space by major global financial institutions and identify major use cases or products banks are exploring. Using the list of global systemically important banks (G-SIBs) published by the Financial Stability Board and news reports of other key financial players, 22 financial institutions were selected based on asset size, geographical representation, and public expression of interest or engagement in this emerging industry.¹ To gather information on whether a bank has implemented or is developing a specific use case, we reached out to a representative of the bank for comment. If no contact point was available, data was collected through annual reports, research publications by the bank or consulting firms, as well as news releases. In summary, data was collected on (i) how the banks have used or intend to use blockchain technology or cryptocurrencies and (ii) the number of blockchain or cryptocurrency use cases per bank.

Lastly, throughout this paper we will interchangeably use the terms cryptocurrency, crypto asset, digital asset, and digital currency to refer to assets that are meant to “constitute a peer-to-peer alternative government-issued fiat currency; a general-purpose medium of exchange independent of a central bank” and recorded on a distributed ledger using cryptography.²

3. Industry Trends in Blockchain and Cryptocurrencies

Blockchain has been gaining attention in the past few years as a technology with potential to disrupt processes and business models across many industries. While payments via digital assets have been the first major application of the technology, many firms are also exploring other use cases. The financial sector is one of the industries that has been the most engaged in understanding the impact of this new technology on business processes and models. More and more global banks are adopting or developing blockchain use cases or exploring new cryptocurrency products. The team analyzed 22 global banks in order to benchmark the adoption of blockchain use cases and cryptocurrency products and highlight emerging trends in the financial sector.

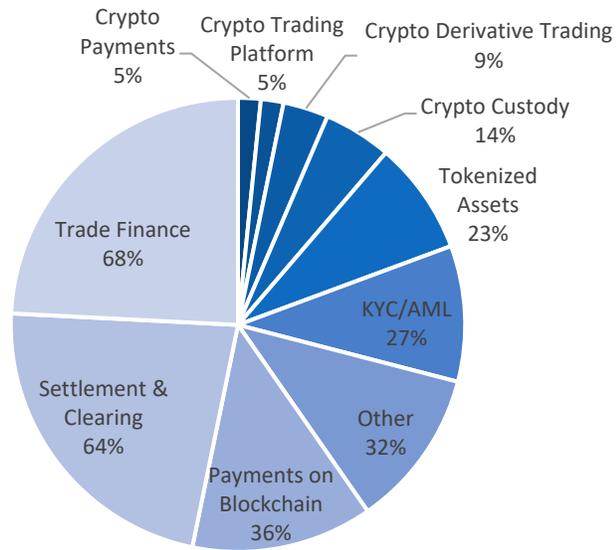
The findings suggest that trade finance, settlement and clearing, and cross-border payments were the most popular blockchain use cases for financial institutions, with a few banks also engaged in blockchain-based syndicated lending. Popular cryptocurrency products included tokenized assets and cryptocurrency custody services.

US and European banks appear to be ahead of their peers with respect to blockchain and cryptocurrency adoption. JP Morgan leads with six use cases, while the average number of use cases for banks in this sample was 2.8. A detailed case study on JP Morgan follows in section 9.2. Additionally, the most popular blockchain and cryptocurrency use cases have been shortlisted and explored deeper in parts II and III of this report.

¹ 2018 List of Globally Systemically Important Banks (G-SIBs). Financial Stability Board. Retrieved from <http://www.fsb.org/wp-content/uploads/P161118-1.pdf>

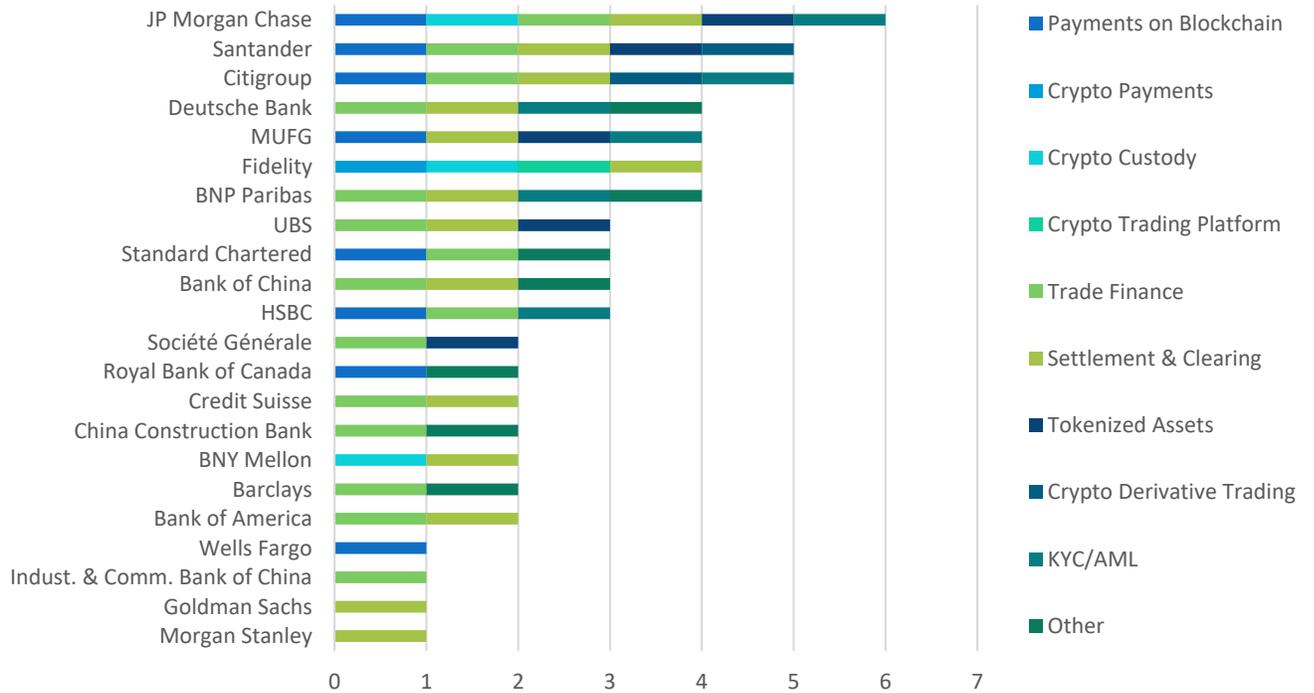
² Ernst & Young (2018) IFRS Accounting for crypto-assets. Retrieved from [https://www.ey.com/Publication/vwLUAssets/EY-IFRS-Accounting-for-crypto-assets/\\$File/EY-IFRS-Accounting-for-crypto-assets.pdf](https://www.ey.com/Publication/vwLUAssets/EY-IFRS-Accounting-for-crypto-assets/$File/EY-IFRS-Accounting-for-crypto-assets.pdf)

Figure 1: Types of Crypto and Blockchain Use Cases by Financial Institutions (implemented or developing)



Source: Based on authors' research and calculations

Figure 2: Blockchain and Crypto Use Cases by Financial Institutions (implemented or developing)



Source: Based on authors' research and calculations

PART II: CRYPTOCURRENCIES

4. The Cryptocurrency Market

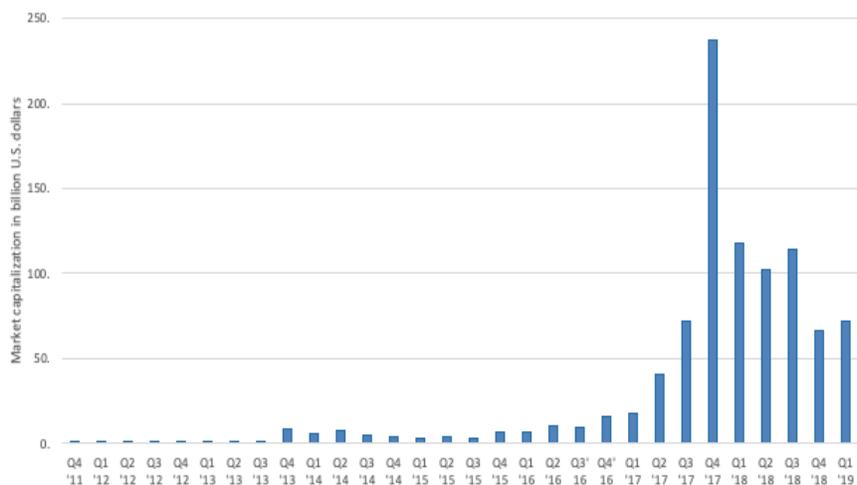
In 2009, an unnamed developer/s with the pseudonym Satoshi Nakamoto released a white paper titled “Bitcoin: A Peer-to-Peer Electronic Cash System,” thereby creating the first decentralized cryptocurrency. While the concept of electronic money has been around since the early 1980s, Bitcoin differed from any previous design attempts by adopting decentralized control through a distributed ledger technology called blockchain. Not only did this new method solve the double-spending problem without a need for a trusted authority like a central bank, but cryptocurrencies powered by blockchain are also secure by design.

In the past decade, the cryptocurrency market has grown significantly. There are now over 2,160 cryptocurrencies with almost \$200 billion in market capitalization.³ Bitcoin, being the first and most widely used cryptocurrency, has the largest market capitalization followed by Ethereum, Ripple and Bitcoin Cash. Furthermore, research published by the University of Cambridge in 2017 estimates that there are between 2.9 to 5.8 million unique cryptocurrency users.⁴

However, in January 2018, the cryptocurrency market crashed. Today, its value is 85% lower than its 2018 peak, which was at a collapse even bigger than the dot-com bubble.

Nonetheless, cryptocurrencies are becoming increasingly integrated into global financial systems and interest from financial institutions is high. According to research from Fidelity Investments in 2019, where over 400 US institutional investors were surveyed to better understand how investors view digital assets as part of their investment portfolio, about 22% of institutional investors have already had some exposure to digital assets within the past three years and nearly half view them as a new or alternative asset class in their investment portfolios.⁵ Furthermore, institutional investments in digital assets are likely to increase over the next five years. However, opinions differ on whether to invest in digital assets directly, passively, or at all.

Figure 3: Bitcoin Market Cap from Q4 2011 to Q1 2019



Source: Blockchain Luxembourg and Statista

³CoinMarketCap.

⁴Hileman, G. & Rauchs, M. (2017) Global Cryptocurrency Benchmarking Study - University of Cambridge. Retrieved from https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2017-global-cryptocurrency-benchmarking-study.pdf

⁵Fidelity Investments (2019). Retrieved from https://www.fidelity.com/bin-public/060_www_fidelity_com/documents/press-release/institutional-investments-in-digital-assets-050219.pdf

Despite growing popularity, cryptocurrencies continue to face many criticisms. Its anonymous qualities are perceived to make it easier for people to engage in illegal transactions, money laundering, and sanctions evasion. Its mining process consumes high amounts of electricity. Cryptocurrency exchanges and wallets have experienced a plethora of high-profile hacks. Speculative investments in cryptocurrencies have allowed some to compare the Bitcoin hype to the Tulip Mania in the Netherlands in 1637 and the dot-com bubble in 1999. As a result, the legality of its status as a fiat or official currency is often questioned and has led to either an absolute or an implicit ban in certain countries including China. Additionally, regulators in the US, and many globally, have yet to establish a clear regulatory framework. Investors and financial institutions have thus far maintained a cautious stance towards the industry.

In the following sections, the paper evaluates cryptocurrencies through four business use cases, challenges for market adoption, the regulatory landscape, and unique financial crime challenges.

5. Cryptocurrencies: Business Use Cases and Adoption

5.1. Cryptocurrency Business Use Cases

5.1.1. Cryptocurrency Custody Solutions

What is the opportunity? With growing interest in cryptocurrency markets by institutional investors, there has been increasing demand for third-party custody solutions for cryptocurrency assets. Institutional investors are hesitant to entering the market, in large part due to the lack of established custodians providing services for cryptocurrencies. There may be an opportunity for financial institutions to fill in this gap and build out some of the market infrastructure. Traditional custodians may be a preferred partner for institutional clients, as they have the advantage of providing established governance and control frameworks and large balance sheets, as well as lower reputational risks.⁶

Why is this needed? Regulated cryptocurrency custody solutions could be a catalyst for the flow of institutional capital into the cryptocurrency market. Cryptocurrency custody with an established custodian, as opposed to a crypto startup, would help institutions safeguard their digital assets and feel more comfortable doing so, especially if it is with an existing partner. Additionally, the SEC requires institutional investors with customer assets of over \$150 million to store those assets with a qualified custodian, such as a bank or trust. If crypto ETFs get approved by the SEC, qualified custodians would be needed to hold their assets. While there are some crypto startups that provide custody services, and are becoming more regulated, reputational risks are high, as the industry has been rocked with cyber hacks and thefts.

Who are the main players? Several crypto firms and a few banks have launched crypto custody services aimed at institutional clients. BitGo (backed by Goldman Sachs), Coinbase, Gemini, Kingdom Trust, and Xapo are some of the largest crypto players offering third-party custody solutions for digital assets.⁷ In early 2019, Fidelity Investments launched a custody service for institutional investors and is currently only supporting Bitcoin.⁸ Bakkt, a cryptocurrency trading platform to be

⁶ Kennedy, K. (2018, October). BNY Mellon. Crypto Custody. Retrieved from <https://www.bnymellon.com/us/en/our-thinking/crypto-custody.jsp>

⁷ Zheng, S. (2018, February 4). The Block. Mapping out crypto custody solutions. Retrieved from <https://www.theblockcrypto.com/2018/10/04/mapping-out-crypto-custody-solutions/>

⁸ Note: Fidelity is expected to launch over the counter trade execution for Bitcoin later in 2019.

launched by the Intercontinental Exchange (ICE), recently announced their acquisition of the Digital Asset Custody Company (DACC), which supports more than 100 cryptocurrencies and 13 blockchains, and a partnership with BNY Mellon for geographically-distributed private key storage.⁹ In 2018, Nomura teamed up with Ledger, a crypto security firm, and Global Advisors, a crypto investment fund, to announce Komainu, an institutional grade custody service for crypto assets.¹⁰ The Block and Bloomberg have reported that Goldman Sachs is exploring its own crypto custody service.¹¹ More recently, according to Coindesk, IBM and investment firm Shuttle Holdings announced the upcoming launch of a crypto custody service built on IBM's private cloud and encryption technologies.¹² IBM and Shuttle Holdings are expected to offer this technology to a range of financial service providers and high net worth individuals who want to use it.

What are the challenges?

Technology: Secure key management is a critical challenge associated with crypto custody. To transact with crypto assets, customers need private keys, which are a complex combination of numbers and letters. Banks must decide to safeguard private keys in hot storage, cold storage, or a combination of both infrastructure types. Hot storage is connected to the internet. While it is more liquid and convenient for daily, its online exposure increases susceptibility to cyber hacks. Cold storage is disconnected from the internet. While its offline nature offers more security, it is difficult to move crypto holdings on short notice, providing less liquidity. Custodians must also manage cybersecurity risks posed by their interface with public blockchains when transferring crypto assets.

Operations: Banks must carefully assess the features of coins to ensure they can be properly serviced. Some coins are classified as money, others as commodities, some as securities, and some could even have multiple classifications. Banks must also assess the degree of anonymity inherent in each type of coin to ensure they can properly comply with AML/KYC rules. Additionally, cryptocurrencies may go through or forks, where a public blockchain splits in two and duplicates the original cryptocurrency, or airdrops, where a public blockchain is copied and a new asset is created and claimed by owners of the original asset class.¹³ Custodians must assess if their infrastructure is equipped to hold multiple cryptocurrencies and decide which forks and airdrops they will support.

Risk and Regulations: Few regulators around the world have issued formal frameworks and guidance for regulating cryptocurrencies, including servicing crypto assets. Lack of regulatory clarity on categorization of cryptocurrencies, security protocols around cryptocurrency storage, and unforeseen regulatory announcements present a risk to this product offering. Potential custodians must work to manage operational, regulatory, and reputational risks associated with unregulated cryptocurrency markets, reputation for hacks and potential fraud, and anonymity of cryptocurrency users. Banks must apply strict controls to ensure that their engagement with crypto assets and counterparties are compliant with AML/KYC procedures.

⁹ White, A. (2019, April 29). Medium. Custody at Our Core. Retrieved from <https://medium.com/bakkt-blog/custody-at-our-core-15f6b26d16d6>

¹⁰ Nomura. News Release. (2018, May 15). Nomura, Ledger and Global Advisors Partner to Explore Building a Secure Digital Asset Custody Solution. Retrieved from <https://www.nomuraholdings.com/news/nr/holdings/20180515/20180515.pdf>

¹¹ Woodford, I. and Chaparro F. (2019, March 7). The Block. Here's what BitGo's CEO expects of Goldman Sachs' and Fidelity's crypto custody plans. Retrieved from <https://www.theblockcrypto.com/2019/03/07/heres-what-bitgos-ceo-expects-of-goldman-sachs-and-fidelitys-crypto-custody-plans/>

¹² Allison, I. (2019, March 12). Coindesk. IBM Quietly enters crypto custody market with tech designed for banks. Retrieved from <https://www.coindesk.com/ibm-quietly-enters-crypto-custody-market-with-tech-designed-for-banks>

¹³EY. Crypto: Managing the new asset class. Retrieved from <https://www.ey.com/gl/en/industries/financial-services/ey-cryptocurrencies-and-cryptoassets>

5.1.2. Derivative Trading

What is the opportunity? Recent research from Fidelity suggests that not only are institutional investors already engaging with digital assets, but also 40% are open to investing in the next five years.¹⁴ Financial institutions may have an opportunity to generate new revenue streams by offering cryptocurrency derivatives. Given the nascency of the cryptocurrency market, there are few derivative products available and few institutions who clear Bitcoin futures on a case-by-case basis.

Who are the main players? Only a few exchanges currently offer cryptocurrency derivatives trading. These include Cboe and CME, as well as LedgerX, BitMEX, OKEx, and Crypto Facilities. In March 2019, Cboe announced it would no longer list Bitcoin futures contracts for trading.¹⁵ Bakkt and Nasdaq have also announced plans to launch Bitcoin derivatives for trading in 2019. There have also been reports that Goldman Sachs began offering select clients Bitcoin non-deliverable forward contracts.¹⁶

What are the challenges?

Risk and Regulation: Regulatory uncertainty is a major challenge for the cryptocurrency derivatives market. The SEC has not approved any crypto asset management products. The regulator has listed concerns about the potential for fraud and manipulation, lack of market size, and lack of regulation of the underlying cryptocurrencies.

Reputational Risk: Fraud and price manipulation in the cryptocurrency market could lead to reputational risks for institutions engaged in trading crypto derivatives. As opposed to stock and bond markets, the integrity of the cryptocurrency market is more at risk. One reason for this may be trading bots, which are programmed to drive price manipulation.¹⁷ As a result, the bots inflate the price of certain cryptocurrencies and traders may overpay. Additionally, the cryptocurrency market has been ripe with exchange hacks and ICO fraud, contributing to a negative stigma around the market.

Nascent Market: The market for cryptocurrency derivatives is still fairly nascent. This means that the infrastructure is still developing, and investors are still figuring out how to hedge risk. Additionally, the cryptocurrency regulatory regime remains unclear, proving challenging for derivative issuers.

5.1.3. Trend Spotlight: Stablecoins

The high volatility of cryptocurrencies represents a huge hurdle in allowing them to become a reliable medium of exchange. Stablecoins, which are digital assets whose value is pegged to a fiat currency, commodity, or other cryptocurrency, are one way to address this issue. In fact, they are considered by many in the financial services industry to have great potential in helping drive market adoption of the cryptocurrency industry.

Currently, the US Dollar has been the main currency backing mainstream stablecoins. Tether, for example, has been dominating the stablecoin market share. According to Coinmarketcap, Tether ranks in the top ten cryptocurrencies by market capitalization, and its daily trading volume is only

¹⁴ Fidelity Investments. (2019, May 9). Press Release. New Research from Fidelity Finds Institutional Investments in Digital Assets Are Likely to Increase Over the Next Five Years. Retrieved from http://www.fidelity.com/bin-public/060_www_fidelity_com/documents/press-release/institutional-investments-in-digital-assets-050219.pdf

¹⁵ Osipovich, A. (2019, March 18). Cboe Abandons Bitcoin Futures. Retrieved from <https://www.wsj.com/articles/cboe-abandons-bitcoin-futures-11552914001>

¹⁶ Faridi, O. (2018, October 31). Goldman Sachs is Now Offering Bitcoin (BTC) Derivatives Products, No Ether (ETH) Contracts For Now. Retrieved from <https://www.cryptoglobe.com/latest/2018/10/goldman-sachs-is-now-offering-bitcoin-btc-derivatives-products-no-ether-eth-contracts-for-now/>

¹⁷ Report: Crypto Market Integrity "at Risk" Due to Bot-Driven Price Manipulation. (2018, October 02). Retrieved from <https://www.newsbtc.com/2018/10/02/report-crypto-market-integrity-at-risk-due-to-bot-driven-price-manipulation/>

second to Bitcoin. However, Tether's dominance may be challenged, as recent allegations by the New York Attorney General's office about crypto exchange Bitfinex using loans provided by Tether to cover funding gaps are hurting the coin's reputation, and other coins such as Paxos Standard Token (PAX), TrueUSD (TUSD), and USD Coin (USDC) are gaining traction. The competition and crypto space will ensure that the coins with lower transaction costs, higher liquidity, and which are regulated will dominate.

Recently Facebook announced ambitious plans of developing its own stablecoin for money transfer through WhatsApp, with an initial focus in India. As the largest social media company in the world with over 2 billion users, Facebook's testing a stablecoin for payments could be a catalyst for crypto adoption globally and could help accelerate the entrance of financial institutions into the market.

Stablecoins still face a few challenges. First, the current regulatory landscape is still fragmented. Stablecoins' legality is still unclear given these coins are backed from assets to computer algorithms. Only a few stablecoins are regulated, such as the Paxos Standard (PAX) and the Gemini Dollar (GUSD). Second, it's uncertain if stablecoins are fully collateralized. Tether was questioned by the public as it has issued more USDT than USD reserves it backed, while refusing to release its internal audit. Last month in April, the Supreme Court of State of New York disclosed that only 74% of Tether coins were backed by cash and securities. However, Tether claimed they were fully backed by cash and cash-equivalent prior to the court dispute. Based on R3's report of "Will Businesses Ever Use Stablecoins?", large financial institutions must consider creative ways for adopting stablecoins. Signature Bank is one of the earliest examples, having onboarded over 100 clients to its blockchain-based Signet system where they can facilitate payments. In February 2019, JP Morgan Chase announced the launch of a similar system built on Quorum the firm's own blockchain platform. The firm had developed JPM Coin, a digital asset backed by US dollars, for institutional clients, as the pilot group, to use for faster and cheaper payments.

5.2. Cryptocurrency Adoption and Challenges

Mainstream adoption of cryptocurrencies remains nascent, and participation by financial institutions appears to be falling. Daily median transaction size fell to \$130 in early 2019, down from a peak of \$5,000 in early 2018.¹⁸ Listing of Bitcoin futures aimed to increase appeal of the crypto market to institutional investors, given the credibility and transparency associated with this trading. Yet, Bitcoin futures volumes as a fraction of total Bitcoin trading volume on cryptocurrency exchanges has fallen to below 1%, from a high of 10% in the summer. Nonetheless, the Bitcoin futures market is larger than previously thought, relative to the Bitcoin spot market, according to new research by Bitwise.¹⁹

Bitwise, a crypto asset management firm awaiting SEC approval for a crypto ETF, reported that almost 95% of Bitcoin trading volume is artificially created by unregulated exchanges.²⁰ In their analysis of the top 81 crypto exchanges, Bitwise determined that of \$6 billion in aggregate daily trading volume over four days, only \$273m was real.²¹ Concerns about market manipulation, significant market size, and lack of regulatory data have stalled regulatory approval for the launch of several proposed crypto ETFs by the asset management industry. In fact, the SEC rejected ten

¹⁸ (2019, January 30). JP Morgan Perspectives: Blockchain and Cryptocurrencies in 2019. Retrieved from <https://medium.com/@mostmojo/jp-morgan-perspectives-blockchain-and-cryptocurrencies-in-2019-tldr-1ae625801f2>

¹⁹ De, N. (2019, March 22). Bitcoin Futures Volume Is More Significant Than You Think, Bitwise Says. Retrieved from <https://www.coindesk.com/bitcoin-futures-volume-is-more-significant-than-you-think-bitwise-says>

²⁰ Vigna, P. (March 22). Most Bitcoin Trading Faked by Unregulated Exchanges, Study Finds. *Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/most-bitcoin-trading-faked-by-unregulated-exchanges-study-finds-11553259600?shareToken=ste90e80f8d18f47cb896491914f06cea3>

²¹ Orcutt, M. (2019, March 26). Nearly all Bitcoin trades are fake, apparently. *MIT Technology Review*. Retrieved from <https://www.technologyreview.com/the-download/613201/nearly-all-bitcoin-trades-are-fake-apparently/>

Bitcoin ETF proposals in 2018, and no crypto asset management products have been approved to date.²² Approval of crypto ETFs will bring new products into the institutional toolbox and could advance market legitimacy and adoption.

Exchanges are also working on developing new structures that address regulatory concerns.

Ongoing product development at ICE/Bakkt aims to create an innovative clearing and surveillance structure for trading, custody, and clearing of crypto assets. Institutional investors may find Bakkt's structure appealing as it offers investor protection in purchasing crypto assets through regulated ICE's member broker-deals and regulated cold storage of those assets. Protections offered in these new structures could help to build trust and legitimacy in the cryptocurrency market, and potentially boost involvement of institutional investors, which would also expand the liquidity and size of the crypto market. Regulatory approval for Bakkt is still pending, and it will take time to attract a sizeable number of customers to the platform. More broadly, regulatory clarity will speed up the process of financial institutions getting into the market as well as the expansion of public investment vehicles.

6. Cryptocurrency Regulatory Landscape

6.1. Overview of Global Regulatory Landscape

Cryptocurrency regulatory objectives can be classified into three categories: 1) combating the use of funds for illicit activities, 2) protecting consumers and investors against fraud and other abuses, and 3) ensuring the integrity of markets and systemic financial stability. The value of most cryptocurrencies shrank greatly in 2018, as the market experienced a breakdown. 2019 has been a year of increasing regulatory scrutiny of the crypto industry around the globe, as regulators are becoming more aware of the growing inherent risks to consumers. Another area of concern has been around the potential use of cryptocurrencies for money laundering, terrorist financing, and illicit transactions. According to CipherTrace, by 2020, FinCEN, SEC, FATF, G20, EU, Japan, Malta, and Bermuda will all have enforced AML compliance related to crypto assets. Although its underlying technology, blockchain, has been welcomed by regulators in many countries, the unclear regulatory landscape on cryptocurrency remains a pressing issue for the industry's growth. One approach major regulatory approach some countries have taken is applying existing securities laws to cryptocurrency businesses and initial coin offerings (ICOs), mainly to protect consumers and investors.

Given the nascent stage of crypto assets and the complexity of jurisdictional structures globally, countries have taken independent regulatory stances towards crypto assets. There has been little global coordination on cryptocurrency regulation, and a global standard does not yet exist. In this chapter, we will break down the global regulatory landscape into three parts: the US as our main focus, the EU, and the Asia and Pacific region.

6.2. US Regulatory Landscape

The current regulatory framework on crypto assets in the US remains fragmented. There is a lack of clarity when it comes to defining cryptocurrency and clear guidelines for regulations. While cryptocurrency regulation has progressed speedily in countries such as Switzerland, Malta, and

²² (2019, January 30). JP Morgan Perspectives: Blockchain and Cryptocurrencies in 2019. Retrieved from <https://medium.com/@mostmojo/jp-morgan-perspectives-blockchain-and-cryptocurrencies-in-2019-tldr-1ae625801f2>

Bermuda, the US faces great challenges to reduce the complexity of the currently fragmented regulatory approaches and strike the right balance between consumer protection and innovation. It requires collaboration and consensus among different regulators and lawmakers on both a federal and state level to generate clear and coordinated guidance.

Regulators within the US have continued to communicate a “do no harm” approach to regulations, embracing the new technology but also attempting to properly mitigate risks. Policymakers are acting slowly in order not to discourage innovation. As CFTC Chairman Chris Giancarlo stated in September, 2018, “When it comes to policy making, I think we need to be slow and deliberate and well informed.”²³ In an attempt to foster innovation, the SEC launched a Strategic Hub for Innovation and Financial Technology (FinHub) within the agency, to serve as a resource for public engagement on the SEC’s FinTech-related issues.²⁴ On the other hand, SEC rejected nine Bitcoin ETF applications in August, 2018, citing the applicants’ failure to demonstrate how they could prevent fraud and manipulation, and has delayed its decision on the latest ETF application from the VanEck SolidX Bitcoin Trust.

6.2.1. Regulatory Landscape on a Federal Level

On the federal level, there has been a fragmented regulatory response so far. One main challenge has been around providing a clear and consistent definition of a cryptocurrency. Different regulators have presented different definitions of what a cryptocurrency is. For example, the Security and Exchange Commission (SEC) is looking at cryptocurrency through the lens of securities and applies related securities regulation. The Commodity Futures Trading Commission (CFTC) deemed cryptocurrency as a commodity, while the Internal Revenue Service (IRS) regulates it as a property.

Latest Developments, Actions, and Announcements from Regulators:

SEC:

- On March 12, the SEC chairman claimed that **Ethereum (ETH) is not a security**, and cryptocurrencies similar to Ethereum are also exempt from being classified as securities.²⁵
- On April 3, the SEC **published guidelines to assist the public in gaining clarity on the legality of a crypto investment opportunity**.²⁶ SEC also issued a no-action letter to TurnKey Jet and confirmed that TKJ tokens are not securities with following reasons: the token price will be pegged at one dollar during the sale; the platform will be fully developed and operated; funds won’t be used to develop the platform; tokens are marketed as utilities rather than for profits.²⁷
- On April 8, chairman Jay Clayton **highlighted cryptocurrencies’ appearance in the SEC’s in-house Examination Priorities for 2019** – suggesting that the **US is taking slow but**

²³ Tan, Weizhen. “Cryptocurrency Regulation Requires a ‘Do No Harm’ Approach, US Regulator Says.” CNBC, September 14, 2018. <https://www.cnbc.com/2018/09/14/do-no-harm-in-regulating-cryptocurrencies-but-be-vigilant-cftc.html>.

²⁴ “SEC.gov | SEC Launches New Strategic Hub for Innovation and Financial Technology.” Accessed May 12, 2019. <https://www.sec.gov/news/press-release/2018-240>.

²⁵ Crypto Regulation: SEC Staff Publish Guidelines on Digital Assets. (2019, April 3). Retrieved from <http://www.newsbtc.com/2019/04/03/crypto-regulation-sec-staff-publish-guidelines-on-digital-assets/>

²⁶ Hinman, B., & Szczepanik, V. (2019, April 03). Statement on "Framework for 'Investment Contract' Analysis of Digital Assets". SEC. Retrieved from <https://www.sec.gov/news/public-statement/statement-framework-investment-contract-analysis-digital-assets>

²⁷ Zmudzinski, A. (2019, April 04). US SEC Releases No-Action Letter Confirming TurnKey Jet ICO Tokens Are Not Securities. Retrieved from <https://cointelegraph.com/news/us-sec-releases-no-action-letter-confirming-turnkey-jet-ico-tokens-are-not-securities>

comprehensive steps on cryptocurrencies' regulatory formalization at the national level.²⁸

- On April 11, Blockstack – the decentralized computing network – applied to launch a \$50 million token sale, with participation from a Harvard endowment. **If approved, this would be industry's first SEC-qualified offering.**²⁹
- On April 29, the SEC announced the temporary suspension of trading in the securities of Bitcoin Generation – a crypto exchange.³⁰

CFTC:

- The CFTC announced in February 2019 that it would **prioritize internal examination on cryptocurrency** this year and would include various crypto-related aspects in its Division of Market Oversight (DMO), Division of Swap Dealer & Intermediary Oversight (DSIO) and Division of Clearing and Risk (DCR) papers.³¹
- On April 5, CFTC chairman J. Christopher Giancarlo reiterated **the agency's commitment to monitor, but not impede, the development of the crypto asset sector**, stating "We have resisted calls to use our legal powers to suppress the development of crypto-assets. [...] Instead, we have favored close monitoring of market developments while not hindering the introduction of new products like Bitcoin futures, which have proven invaluable in letting market forces determine the appropriate value of the bitcoin."³²
- On April 24, the SEC's Office of Investor Education and Advocacy and the CFTC's Office of Customer Education and Outreach have **jointly issued an alert warning investors against crypto-related investment scams.**³³
- On May 6, an unnamed official from CFTC claimed that **CFTC would consider ETH-based futures**, stating "I think we can get comfortable with an ether derivative being under our jurisdiction. If they came to us with a particular derivative that met our requirements, I think that there's a good chance that it would be [allowed to be] self-certified by us."³⁴
- On May 1, the current CFTC chairman Christopher Giancarlo said, "explosion in interest in cryptocurrencies will likely lead to new applications for clearinghouses."³⁵

²⁸ Suberg, W. (2019, April 11). SEC Chairman Flags Crypto as Continued Regulatory Focus in Latest Speech. Retrieved from <https://cointelegraph.com/news/sec-chairman-flags-crypto-as-continued-regulatory-focus-in-latest-speech>

²⁹ Huillet, M. (2019, April 12). Blockstack Eyes SEC-Regulated \$50 Mln Token Sale With Participation From Harvard Endowment. Retrieved from <https://cointelegraph.com/news/blockstack-eyes-sec-regulated-50-mln-token-sale-with-participation-from-harvard-endowment>

³⁰ Simms, T. (2019, April 30). SEC Suspends Trading in Securities of Crypto Exchange Bitcoin Generation. Retrieved from <https://cointelegraph.com/news/sec-suspends-trading-in-securities-of-crypto-exchange-bitcoin-generation>

³¹ Suberg, W. (2019, February 16). CFTC's First Published 2019 Examination Priorities Reveal Major Cryptocurrency Focus. *Cointelegraph*. Retrieved from <https://cointelegraph.com/news/cftcs-first-published-2019-examination-priorities-reveal-major-cryptocurrency-focus>

³² Admin. (2019, April 05). US CFTC Chair Says Agency Has Resisted Calls to Suppress Development of Crypto Sector. Retrieved from <http://cryptoseason.com/2019/04/05/us-cftc-chair-says-agency-has-resisted-calls-to-suppress-development-of-crypto-sector/>

³³ Peterson, K. (2019, April 26). US SEC and the CFTC have jointly issued an alert warning investors against fraudulent websites purporting to operate trading businesses. Retrieved from <https://www.mooncatchermeme.com/u-s-sec-and-the-cftc-have-jointly-issued-an-alert-warning-investors-against-fraudulent-websites-purporting-to-operate-trading-businesses/>

³⁴ Suberg, W. (2019, May 07). CFTC 'Can Get Comfortable' With Ether Futures Product, Says Anonymous Official. Retrieved from <https://cointelegraph.com/news/cftc-can-get-comfortable-with-ether-futures-product-says-anonymous-official>

³⁵ Alexandre, A. (2019, May 02). US CFTC Chair Says Interest in Crypto Could Bring About More Clearinghouses. Retrieved from <https://cointelegraph.com/news/us-cftc-chair-says-interest-in-crypto-could-bring-about-more-clearinghouses>

IRS:

- Over 20 lawmakers **urged the IRS to clarify three specific areas**: acceptable methods for calculating cost basis of virtual currencies; acceptable methods of cost basis assignment and lot relief for virtual currencies; and tax treatment of forks for taxpayers using virtual currencies.³⁶

FinCEN:

- On April 21, FinCEN took the **first enforcement action** against a California resident with who violated money transmission laws in his work as a peer-to-peer exchanger of virtual currencies with a \$35,000 fine.³⁷

The latest movements from regulatory bodies suggest that the US is taking a slow but comprehensive approach regarding cryptocurrency regulation. Regulators have also adopted an unconventional approach for addressing regulatory concerns through organizing meetups to speak with entrepreneurs, investors, and technology firms in this industry. Although there has been some effort between regulators to communicate guidance and warnings about the industry, the federal landscape in the US needs greater collaboration and information sharing among different regulators to generate clear jurisdictions and guidelines. The role of Congress is also essential. New laws regarding the definition and regulation of cryptocurrency jurisdiction need to be proposed and passed. Several bills were proposed, such as the Token Taxonomy Act by Representative Warren Davidson, how far these bills can go is still a question. The Token Taxonomy Act was already voted down in a previous session of Congress.³⁸ It was reintroduced on 9th, April 2019.³⁹

³⁶ De, N. (2019, April 11). 21 US Lawmakers Urge IRS (Again) to Clarify Crypto Tax Rules. *CoinDesk*. Retrieved from <https://www.coindesk.com/us-lawmakers-renew-call-for-irs-to-clarify-crypto-tax-rules>

³⁷ Huillet, M. (2019, April 20). FinCEN Takes First Enforcement Action Against P2P Cryptocurrency Exchanger. Retrieved from <https://cointelegraph.com/news/fincen-takes-first-enforcement-action-against-p2p-cryptocurrency-exchanger>

³⁸ GovTrack.us. (2019). H.R. 7356 — 115th Congress: Token Taxonomy Act. Retrieved from <https://www.govtrack.us/congress/bills/115/hr7356>

³⁹ Davidson, Warren. "Text - H.R.2144 - 116th Congress (2019-2020): Token Taxonomy Act of 2019." Webpage, April 9, 2019. <https://www.congress.gov/bill/116th-congress/house-bill/2144/text>.

6.2.2. Regulatory Landscape on a State Level

As of 2019, there has been mixed progress and action around cryptocurrency regulation on the state level. States can be divided into three categories based on their attitude towards crypto assets:

Crypto Friendly:

Since January 2019, Colorado, Wyoming, Rhode Island, Connecticut, and Utah have proposed new bills and legislation to adopt blockchain and cryptocurrency. These states act as crypto pioneers, taking proactive approaches to allowing cryptocurrency and blockchain business to grow in their states.

Crypto Cautious:

Other states have expressed great concern about potential risks associated with crypto businesses. In these states, protecting consumers and investors comes before economic opportunities. New York has been among the strictest cases, with the New York State Department of Financial Services creating the Bitlicense as a prudent response to potential crypto industry risks. After a three year wait, Bitstamp was granted the 19th Bitlicense by NYDFS in April 2019 to expand its crypto services.⁴⁰ The Bitlicense has faced backlash from entrepreneurs, due to strict requirements, laborious documents, and long approval time.

Crypto Neutral:

A large number of states, such as Indiana, and Florida, have not yet published guidelines or made official statements regarding crypto assets.

Figure 4: US Regulatory Progress at the State Level in 2019



⁴⁰ De, N. (2019, April 09). Bitstamp Granted BitLicense, Will Expand Crypto Services in US. Retrieved from <http://www.coindesk.com/bitstamp-granted-bitlicense-will-expand-crypto-services-in-us>

6.3. Asia and Pacific Region Regulatory Landscape

In Asia, interest in cryptocurrency has been strong and some active markets have developed. In some countries, Bitcoin and other cryptocurrencies are approved as a means of payment for goods and services, but existing regulations restrict banks from trading or dealing. In this section, we will explore cryptocurrency regulation in China and Japan.

6.3.1. China

The People's Bank of China has been active in cryptocurrency regulation in recent years and has expressed clearly that a cryptocurrency is a virtual commodity, not money. In the Notice on Risk Prevention related to Bitcoin, China clarified in December 2013 that cryptocurrency is not legal tender. All financial institutions and payment providers are forbidden from providing services for or products denominated in bitcoin. Therefore, China's financial institutions' involvement in cryptocurrency will be limited due to the tough regulatory environment.

Regulatory actions on cryptocurrency in China began to tighten in 2017. The rapid growth of ICOs made regulators concerned about fraud and speculation. As a result, in September 2017, Chinese issued a joint statement announcing an immediate ban on all Bitcoin trading and ICOs. Despite near-comprehensive prohibition on crypto trading and related services, the law in China currently still permits crypto mining activities. Recent estimates from Princeton University and Florida International University suggest that China is home to 74% of total global Bitcoin mining.⁴¹ However, in April 2019, China's national planning agency announced that cryptocurrency mining was one industry it was planning on eliminating.⁴² Implementing this ban may have spillover effects, leading Bitcoin mining operations and businesses to relocate to other countries, as was the case when China introduced the cryptocurrency trading and ICO ban. Nonetheless, China's central bank is working on developing its own digital currency, as reported in a statement on PBOC's website.

Recent events in China highlight an important consideration in the cryptocurrency industry: although markets are currently somewhat segmented, cross-border spillover can occur in response to regulatory events. As the market continues to evolve, and if more banks and funds engage in cross-country regulatory arbitrage, regulation and enforcement in one jurisdiction may lead activity to migrate to others with more lax approaches. Coordination has already been found to enhance the effectiveness of AML standards, with authorities seeking to treat similar products and services consistently according to their function and risk profile across jurisdictions.⁴³

6.3.2. Japan

Japan has one of world's most progressive regulatory climates for cryptocurrencies and, as of April 2017, recognized Bitcoin and other digital currencies as legal property under the Payment Services Act. In December 2017, the National Tax Agency ruled that gains on cryptocurrencies should be categorized as "miscellaneous income" and investors should be taxed at rates of 15%-55%.⁴⁴ Japan's Financial Services Agency (FSA) was one of the first regulators to take a constructive approach towards cryptocurrencies. Japan is one of the world's biggest Bitcoin markets.

⁴¹ Kaiser, B., Jurado, M., & Ledger, A. (2018). *The Looming Threat of China: An Analysis of Chinese Influence on Bitcoin*(Publication). Retrieved <https://blockchain.princeton.edu/papers/2018-10-ben-kaiser.pdf>

⁴² Liao, R., & Russell, J. (2019, April). Regulators in China are weighing a ban on Bitcoin mining. *TechCrunch*. Retrieved from <https://techcrunch.com/2019/04/09/china-considers-ban-crypto-mining/>

⁴³ Financial Action Task Force (2015): Guidance for a risk-based approach to virtual currencies, June.

⁴⁴ Crypto Regulations in Japan. Retrieved from <https://complyadvantage.com/knowledgebase/crypto-regulations/cryptocurrency-regulations-japan/>

Regulation of cryptocurrency exchanges in Japan is similarly progressive. Cryptocurrency exchanges are legal. However, after a series of high-profile hacks, including the notorious Coincheck hack of \$537 million in digital currency in January 2018, the FSA stepped up efforts to regulate trading and exchanges. Amendments to the Payment Services Act now require that cryptocurrency exchanges must register with the FSA in order to operate. It also imposes stricter requirements around cybersecurity and Anti-Money Laundering.

Japan remains a friendly environment for cryptocurrencies, yet, increasing AML concerns are prompting the FSA towards taking further regulatory action. In October 2018, FSA gave the cryptocurrency industry self-regulatory status, permitting the Japan Virtual Currency Exchange Association (JVCEA) to police and sanction exchanges for any violations. The FSA approval gives the industry association rights to set rules to safeguard customer assets, prevent money laundering, and give operational guidelines. The association will also oversee compliance.⁴⁵

6.4. EU Regulatory Landscape

European regulators have taken regulatory actions similar to the US. The European Securities and Markets Authority (ESMA) issued a statement on November 2018 alerting investors about the risks of ICOs and firms issuing ICOs, and their need to meet certain regulatory requirements.

The EU Parliament has not passed any specific legislation on cryptocurrencies. In the EU, cryptocurrencies are generally considered legal, but regulations around cryptocurrency exchanges are not uniform across the region. In certain member states, exchanges will have to register with their respective regulators. Cryptocurrency taxation also varies, at rates of 0-50%.

The EU is actively exploring further cryptocurrency regulations. In February 2018, ECB president Mario Draghi said authorities were collaborating with the Single Supervisory Mechanism to develop a way of identifying the financial risks posed by cryptocurrencies.⁴⁶ In April 2018, the EU agreed on the text for the Fifth Anti-Money Laundering Directive (AMLD5), which will bring cryptocurrency-fiat currency exchanges under the EU's anti-money laundering legislation. AMLD5 will require exchanges to perform KYC and due diligence on customers and fulfill standard reporting requirements.¹⁶

6.4.1 The United Kingdom

In the UK, cryptocurrencies are not legal tender. Cryptocurrency exchanges are legal and are required to be registered with Financial Conduct Authority (FCA). In 2014, HM Revenue and Customs (HMRC) issued a brief on the tax treatment of income and charges from activities involving Bitcoin and other cryptocurrencies.⁴⁷ In June, 2018, FCA published guidance on cryptocurrency derivatives, stating that firms offering cryptocurrency derivatives are required to be authorized by the FCA.⁴⁸ The

⁴⁵ "Japan Grants Cryptocurrency Industry Self-Regulatory Status." *Reuters*, October 24, 2018. <https://www.reuters.com/article/us-japan-cryptocurrency-idUSKCN1MY10W>.

⁴⁶ Bank, E. C. (n.d.). European Parliament plenary debate on the ECB Annual Report for 2016. Retrieved May 10, 2019, from European Central Bank website: <https://www.zentral-bank.eu/press/key/date/2018/html/ecb.sp180205.en.html>

⁴⁷ "Revenue and Customs Brief 9 (2014): Bitcoin and Other Cryptocurrencies." GOV.UK. Accessed May 12, 2019. <https://www.gov.uk/government/publications/revenue-and-customs-brief-9-2014-bitcoin-and-other-cryptocurrencies/revenue-and-customs-brief-9-2014-bitcoin-and-other-cryptocurrencies>.

⁴⁸ "Cryptocurrency Derivatives." FCA, April 6, 2018. <https://www.fca.org.uk/news/statements/cryptocurrency-derivatives>.

derivatives include cryptocurrency futures, cryptocurrency contracts for differences (CFDs). In March 2018, the Governor of Bank of England, Mark Carney, called for more cryptocurrency regulation.⁴⁹ He said further regulation is needed due to the “speculative mania” around digital currencies. He believes the global push of crypto regulation would likely to be a “series of national steps”. On January 23rd, The FCA launched a consultation on Guidance for cryptoassets in order to provide regulatory clarity.⁵⁰ The consultation will close on May 4th and policy statement is expected to be published during the summer.

6.4.2 Malta

Malta has taken a very progressive approach to cryptocurrencies.⁵¹ In July 2018, it became the first country to establish a regulatory framework for cryptocurrencies. The specific goal of designing this framework is to attract blockchain and cryptocurrency businesses. The regulatory framework is holistic, covering fraud, money laundering, terrorist financing, and investor abuse.⁵² Cryptocurrencies are not legal tender in Malta while cryptocurrency exchanges are legal and regulated under the VFA (Virtual Financial Assets) Act. There is no specific tax legislation regulating cryptocurrency as a means of exchange.⁵³ The strict crypto-to-crypto anti-money laundering obligations are imposed on a greater range of virtual service providers than in AMLD5, but miners are not included.⁵⁴ However, Malta’s moves to become a global cryptocurrency hub do not come without criticism. In January 2019, the IMF stated the industry’s growth in Malta posed significant risks of money laundering and terrorism financing.⁵⁵

⁴⁹ Kharpal, Arjun. “Bank of England’s Carney Calls for More Regulation around the ‘Speculative Mania’ of Cryptocurrencies.” CNBC, March 2, 2018. <https://www.cnbc.com/2018/03/02/bank-of-england-mark-carney-cryptocurrency-regulation.html>.

⁵⁰ “CP19/3: Guidance on Cryptoassets.” FCA, January 22, 2019. <https://www.fca.org.uk/publications/consultation-papers/cp19-3-guidance-cryptoassets>.

⁵¹ “Crypto Regulations in Malta.” *ComplyAdvantage* (blog). Accessed May 12, 2019. <https://complyadvantage.com/knowledgebase/crypto-regulations/cryptocurrency-regulations-malta/>.

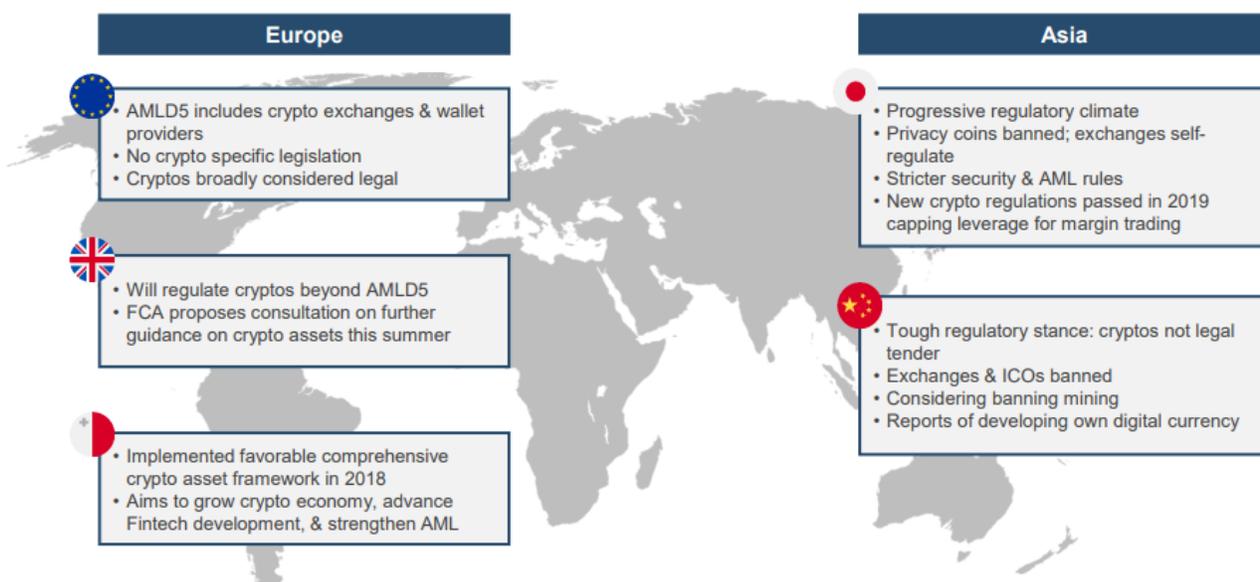
⁵² Ciphertrace, Cryptocurrency Anti-Money Laundering Report, 2018 Q4.

⁵³ Ozelli, Selva. “Malta Emerges as World’s Cryptocurrency Hub Despite EU’s TAX3 Investigation: Expert Take.” Cointelegraph, June 12, 2018. <https://cointelegraph.com/news/malta-emerges-as-world-s-cryptocurrency-hub-despite-eu-s-tax3-investigation-expert-take>.

⁵⁴ Ciphertrace, Cryptocurrency Anti-Money Laundering Report, 2018 Q4.

⁵⁵ Huillet, Marie. “International Monetary Fund Says Growth of Blockchain in Malta Poses Significant Risks.” Cointelegraph, January 24, 2019. <https://cointelegraph.com/news/international-monetary-fund-says-growth-of-blockchain-in-malta-poses-significant-risks>.

Figure 5: Global Regulatory Landscape in Europe and Asia



7. Cryptocurrency Risks

7.1. Financial Crime Risk

The potential of cryptocurrencies to serve as a powerful alternative to traditional payment systems presents several risks alongside its opportunities. There has been much debate on an international as well as national level regarding how to mitigate inherent risks of this emerging sector. In addition to concerns about market volatility and regulatory uncertainty, traditional financial institutions that are assessing their potential involvement in cryptocurrency markets have raised concerns about the use of cryptocurrency assets for financial crime purposes.

Cryptocurrencies have gained some popularity as a means of conducting anonymous illicit transactions, and this is arguably one of the first economic use cases. According to a report by Chainalysis, the proportion of illicit Bitcoin economic activity dropped from 7% in 2012 to less than 1% in 2018, although this is attributable to the growth in adoption of cryptocurrency for other economic activity, namely financial speculation.

A 2018 report by CipherTrace estimated that approximately 380,000 bitcoins (\$2.5 billion at last year's average price) were used to facilitate money laundering on top exchanges.⁵⁶ In addition, Chainalysis' estimated that darknet market activity almost doubled in 2018 from the previous year, with transaction volumes surpassing \$600 million, despite the closure of two popular markets, AlphaBay and Hansa in 2017.

Cybercrime which targets cryptocurrency exchanges can produce significant proceeds for criminals, with an estimated \$1 billion of revenues generated from cryptocurrency exchange hacks in 2018

⁵⁶ *Cryptocurrency Anti-Money Laundering Report, 2018 Q3(Rep.)*. (2018). Retrieved <https://ciphertrace.com/crypto-aml-report-2018q3.pdf>

alone, which will need to be laundered.⁵⁷ In early 2019, the largest cryptocurrency exchange by trading volume in South Korea, Bithumb, fell victim to a hack which resulted in the theft of an estimated \$13 million worth of EOS cryptocurrency.⁵⁸ In May 2019, the Taiwan based Binance, one of the largest cryptocurrency exchanges in the world, was also hacked. This resulted in the theft of 7,000 bitcoins (estimated value of \$40 million).⁵⁹

All of this indicates that illicit economic activity involving the use of cryptocurrency has increasingly become more sophisticated and diversified. In addition, the volume of this activity has significantly increased and may still be on the rise.

7.1.1. Money Laundering Risk

Pseudonymity: The most salient feature of cryptocurrencies is their purported anonymity. This was illustrated by FATF - the global AML standard setting body - in one of the earliest publications issued to address uncertainty raised by the emergence of virtual currencies.⁶⁰ As opposed to traditional payment systems, the use of digital currencies tends to be categorized by non-customer facing relationships, which often occur over the internet. In this respect, the source of funding may not be adequately identified, whether due to cash funding or funding from an exchange with deficient controls. Similarly, the facilitation of anonymous transfers between counterparts poses the same risk.

However, cryptocurrencies, such as Bitcoin, are not completely anonymous. Bitcoin users are identified by their public key/address, and all users are able to see all transactions that happen on the network. If your address is linked to your identity, then your transactions from that address can be linked back to you. With the help of surveillance tools and monitoring software, it has become possible for law enforcement authorities to detect transaction patterns and de-anonymize users. However, recently new “privacy coins”, such as ZCash and Monero, that claim to offer increased levels of anonymity to users have been introduced to the digital asset market.

Challenges Applying KYC & CIP: By design, many cryptocurrency protocols operate with the use of addresses which have no names or customer identification information attached to the transactions. This makes it problematic for traditional financial institutions to implement regular KYC and CIP programs, which are essential foundational elements to any AML program.

Mixer & Tumbler Services: In addition to the inherent pseudonymous nature of most cryptocurrencies, illicit transactions may be more difficult to detect if the use of a mixer or tumbler service is employed. There are a number of third-party service providers offering the ability to disguise the sender/recipient identities, through the mechanism of layering. Therefore, it is difficult to determine the individual identities as well as the geographical locations of counterparts.

7.1.2. Sanction Risk

There is a growing list of international sanctions, primarily issued by the UN, US Office of Foreign Asset Control (OFAC), as well as EU administered sanctions. All banks must ensure their compliance

⁵⁷ *Crypto Crime Report: Decoding increasingly sophisticated hacks, darknet markets, and scams*(Rep.). (2019, January). Retrieved [https://uploads-ssl.webflow.com/5a9360f88433cb00018022c2/5c4f67ee7deb5948e2941fda_Chainalysis January 2019 Crypto Crime Report.pdf](https://uploads-ssl.webflow.com/5a9360f88433cb00018022c2/5c4f67ee7deb5948e2941fda_Chainalysis%20January%202019%20Crypto%20Crime%20Report.pdf)

⁵⁸ Zhao, W. (2019, March 30). Crypto Exchange Bithumb Hacked for \$13 Million in Suspected Insider Job. *Coindesk*. Retrieved from <https://www.coindesk.com/crypto-exchange-bithumb-hacked-for-13-million-in-suspected-insider-job>

⁵⁹ Valinsky, J. (2019, May 08). Hackers steal \$40 million worth of bitcoin in massive security breach. Retrieved from <https://www.cnn.com/2019/05/08/tech/bitcoin-binance-hack/index.html>

⁶⁰ FATF (June 2014), *Virtual Currencies, Key Definitions and Potential AML/CFT Risks*.

through the prohibition of relationships and blocking of transactions for individuals, entities, vessels and aircraft, as well as restricted blocked locations, that appear on the consolidated sanctions lists.

Mitigating sanction risk is high on the agenda for any financial institutions' financial crime program, as the potential fallout can involve large sum fines and other forms of regulatory action, which would be damaging for the institution. Therefore, it is important to keep abreast of the sanctions risk posed by the emerging cryptocurrency market. In April 2018, OFAC announced that it would treat virtual currencies with the same respect as fiat currencies.⁶¹ Therefore, for sanctioned individuals and entities, along with their related counterparts, the use of cryptocurrency as a medium of exchange would make them just as liable as if they had used traditional fiat currency for the transaction.

Sanction Updates

Sanction lists are constantly changing with amendments being made without warning, which could suddenly render an existing or potential financial institution's client to become classified as high risk.⁶² It can be challenging for financial institutions to keep track of changes from multiple sanction issuing bodies, especially without a consolidated list service provider, such as Fircosoft Accuity. Even by enlisting the services of such providers, ultimately it is the financial institution's responsibility to ensure that they are not dealing with any potentially sanctioned individuals, entities, authorities or jurisdictions.

Cryptocurrency in Sanctioned Jurisdictions

There are a number of sanctioned jurisdictions which have produced their own native cryptocurrencies, most notably the oil reserve backed "Petro" cryptocurrency of Venezuela, which is arguably the first sovereign cryptocurrency to be introduced. The initial launch came with claims of sales amounting to \$735 million on the first day, projecting a seemingly high level of adoption, which drew skepticism as to the extent of such claims.⁶³

Similarly, Iran is another jurisdiction which has attempted to introduce its own cryptocurrency, supposedly to circumvent international sanctions (particularly US). PayMon or "Crypto-rial" is the name of the gold backed cryptocurrency introduced by the Iranian authorities in 2019.

It is still early to determine how prevalent the use of sovereign cryptocurrencies will become, but the fact that sanctioned jurisdictions have been some of the first to explore this option suggests that there is a heightened risk of sanctioned individuals, entities, and authorities circumventing international sanctions by using the unregulated cryptocurrency space to enable interaction with the global financial sector.

Sanctioned Wallets

In October 2018, OFAC included two cryptocurrency wallets in the supplementary information relating to two Specially Designated Nationals (SDNs). The associated individuals were Ali Khorashadizadeh and Mohammad Ghorbaniyan, two Iranian nationals that were involved in exchanging digital currency from the illicit proceeds of cybercrime into Iranian Rial.⁶⁴ According to the US Department of Justice, the SamSam ransomware created by Mohammed Mansouri and Faramarz Savandi - two different Iranian nationals, enabled extortion of \$6 million in ransom

⁶¹ US Department of the Treasury. (n.d.). Retrieved from https://www.treasury.gov/resource-center/faqs/Sanctions/Pages/faq_compliance.aspx#559

⁶² KPMG (June 2018), Clarity on Financial Crime in Banking, *Agility, Risk and Culture: Three Priorities for Change*.

⁶³ Pons, C., & Gupta, G. (2018, February 20). Venezuela says launch of 'petro' cryptocurrency raised \$735 million. *Reuters*. Retrieved from <https://www.reuters.com/article/us-crypto-currencies-venezuela/venezuela-says-launch-of-petro-cryptocurrency-raised-735-million-idUSKCN1G506F>

⁶⁴ US Department of Treasury. (2018, November 28). *Treasury Designates Iran-Based Financial Facilitators of Malicious Cyber Activity and for the First Time Identifies Associated Digital Currency Addresses*[Press release]. Retrieved from <https://home.treasury.gov/news/press-releases/sm556>

payments and \$30 million of damages to over 200 victims, many of which were educational and medical institutions.⁶⁵ Although this has been the only instance of OFAC listing cryptocurrency wallets as part of supplementary information, we should expect to see similar possible actions in the future. It will be important for both financial institutions and virtual currency service providers to be able to identify sanctioned wallets.

7.1.3. Fraud Risk

The emergence of cryptocurrencies, particularly with the rising volumes of investment and trade activity, has led to a diverse range of schemes involving theft, scams, and fraud targeting individuals as well as organizations. Many of them can be categorized into the following major types:

ICO Exit Scams: This usually occurs through the popular fundraising platform Initial Coin Offering (akin to an IPO), usually on the Ethereum network. An ICO exit scam involves the creation of a fake investment opportunity, generating enough market hype, ultimately trying to persuade as many individuals to invest as possible. Once completed, the orchestrators of such an operation will take the proceeds before it is exposed as an ICO exit scam, then attempt to launder them.

In an effort to educate consumers, the SEC set up a fake website for “Howey Coin”, as an upcoming ICO attempting to attract investor funds. This was a novel way of informing the public of the dangers of participating in this investment area, without sound knowledge and warranted confidence in the proposed investment.⁶⁶

Exchange Exit Scams: With the downtrend in cryptocurrency markets, as for many volatile industries, when faced with losses and uncertainty, insiders (usually owners) may decide to take all user funds and essentially “pull the plug” on the enterprise, leaving users with nothing. In January 2019, news emerged of the peculiar case of QuadrigaCX, what was Canada’s largest digital asset exchange. The founder was said to have passed away under unusual circumstances leaving \$190 million in crypto assets locked away, with nobody else having the access keys. Although the case is still under investigation and the final outcome has not been determined, some industry experts have labelled it an exit scam.⁶⁷ In May, an investigative report into the matter by Ernst & Young suggested there is only \$21 million to cover user losses.⁶⁸

Phishing Scams: This is a common form of fraud, even outside of cryptocurrency, with the ultimate aim of obtaining and using the victim's identity via deceptive actions. Scammers attempt to obtain usernames, passwords, and private wallet keys through the use of fake emails, air drops, and other possible methods for obtaining the targeted information. Chainalysis estimated that the value of Ethereum stolen via scams reached \$36 million in 2018, more than double the amount in 2017.⁶⁹

⁶⁵ Two Iranian Men Indicted for Deploying Ransomware to Extort Hospitals, Municipalities, and Public Institutions, Causing Over \$30 Million in Losses. (2018, November 28). Retrieved from <https://www.justice.gov/opa/pr/two-iranian-men-indicted-deploying-ransomware-extort-hospitals-municipalities-and-public>

⁶⁶ The SEC Has an Opportunity You Won't Want to Miss: Act Now! (2018, May 16). Retrieved from <https://www.sec.gov/news/press-release/2018-88>

⁶⁷ Copeland, T. (2019, March 14). The complete story of the QuadrigaCX \$190 million scandal. Retrieved from <https://decryptmedia.com/5853/complete-story-quadrigacx-190-million>

⁶⁸ De, N. (2019, May 10). QuadrigaCX Has \$21 Million in Assets and Owes \$160 Million: EY Report. Retrieved from <https://www.coindesk.com/quadrigacx-has-21-million-in-assets-and-owes-160-million-ey-report>

⁶⁹ *Crypto Crime Report: Decoding increasingly sophisticated hacks, darknet markets, and scams* (Rep.). (2019, January). Retrieved [https://uploads-sls.webflow.com/5a9360f88433cb00018022c2/5c4f67ee7deb5948e2941fda_Chainalysis January 2019 Crypto Crime Report.pdf](https://uploads-sls.webflow.com/5a9360f88433cb00018022c2/5c4f67ee7deb5948e2941fda_Chainalysis%20January%202019%20Crypto%20Crime%20Report.pdf)

SIM Swapping: Similar to phishing scams, the aim of this activity is to take advantage of the relative ease of switching an individual's phone number to another telecom provider, through successfully by-passing identity verification of the original service provider. Once completed, the criminal actor can access the victim's cryptocurrency assets that are associated with wallets linked to the victim's phone number.

In May 2019, a California state court ruled in favor of crypto investor Michael Terpin was awarded \$75.8 million in a civil case filed against the perpetrator, Nicholas Truglia, who along with his associates had gained control over the victim's phone number and reset the passwords to gain access to Mr. Terpin's crypto assets, defrauding him of \$24 million. Truglia had been previously arrested for involvement in other SIM swapping cases.⁷⁰

Shady Exchanges/Fake Wallets: Due to the largely unregulated nature of the cryptocurrency industry, there have been instances of nefarious exchanges and wallet providers that pose as legitimate actors, to fool individuals and investors into providing them with their cryptocurrency assets, only for them to be stolen.

Ponzi/Pyramid Schemes: As with examples outside the cryptocurrency space, the primary aim is to persuade investors to encourage others to invest, thus creating a continuous stream of investors that will allow the scheme to continue. There have been several cases of such schemes in the cryptocurrency space. In March 2019, the leader of the \$3.7 Billion "OneCoin" pyramid scheme was arrested by US authorities.⁷¹

7.2. Regulatory Risk

Players involved in the cryptocurrency market are subject to regulatory headwinds. The plethora of regulatory agencies, particularly in the US, has led to regulatory ambiguity around how to effectively regulate digital currencies and digital currency asset services. Crypto entrepreneurs and financial institutions may not be fully aware of various regulatory obligations and may be exposing themselves to greater risk, as a result of the lack of clear and uniform guidance on cryptocurrencies. In fact, in the interviews conducted for this report, financial institutions and other industry players repeatedly cited high regulatory risk as one of the key reasons for maintaining a cautious stance on getting involved in the cryptocurrency industry.

⁷⁰ Zmudzinski, A. (2019, May 11). US Blockchain Investor Terpin Awarded Over \$75 Million in SIM Swapping Case. Retrieved from <https://cointelegraph.com/news/us-blockchain-investor-terpin-awarded-over-75-million-in-sim-swapping-case>

⁷¹ Liao, S. (2019, March 08). The US arrests alleged leader of \$3.7 billion cryptocurrency pyramid scheme. *The Verge*. Retrieved from <https://www.theverge.com/2019/3/8/18256662/us-onecoin-leader-arrested-cryptocurrency-pyramid-scheme>

PART III: BLOCKCHAIN TECHNOLOGY

8. Blockchain Overview and Benefits

A blockchain is a **secure transaction ledger database shared by all parties** in a distributed network. Compared to a traditional distributed database, blockchain adds value by enhancing trust between parties through its immutable, transparent transaction log, which does not have one single point of failure. The distributed and auditable nature of data on the blockchain means that no one party can alter data integrity. Blockchain may be most useful in use cases that have a transactional nature, have intermediaries, require trust and verification, and require multiple participants to read and write the data.

Deployment of blockchain technology has the potential to provide **cost savings, new revenue opportunities, and risk reduction** for a variety of industries. For financial institutions, applications of blockchain technology can streamline and accelerate processes, reduce intermediation, and minimize parallel data maintenance, resulting in cost savings. Revenue enhancement opportunities can come from: selling to new market segments due to lower costs; new geographical markets due to secure identities; new investment products; crypto-funds as a new and growing asset class; and better yield enhancement and liquidity management as a result of shorter settlement cycles.⁷² Investment risk reduction stems from shorter settlement cycles and reduction of intermediaries. Additionally, blockchain technology has the potential to reduce operational risk for banks, due to data security stemming from DLT's inherent immutability and better alignment of data between all parties on a network.⁷³

A blockchain can take a variety of forms. A **public blockchain** gives all users on the network the ability to access information and transact with other users without consent of the operator. A **private blockchain** gives a restricted list of blockchain operators and auditors read access. To submit or read transactions users have to rely on the operator-provided interface. A **permissioned blockchain** allows only a set list of parties to build the blockchain, who are also able to restrict end-use of specific users. A **permissionless blockchain** allows any user to participate in creating the blockchain. Users on a blockchain are identified by **public keys**, which are shared with other users, and **private keys**, which are like private passwords belonging to a specific user and used to complete transactions.

A blockchain can typically have two of the following three characteristics: **decentralization, security, and scalability**. Platforms like Bitcoin provide full decentralization and security, however lack necessary scale, as the Bitcoin blockchain can only process around seven transactions per minute. Private blockchains provide greater scale and security, yet lack decentralization. Many financial services players have started building private or permissioned blockchains to ensure more control over the users on the network and to make it easier to comply with Anti-Money Laundering (AML) and Know Your Customer (KYC) laws. Institutions are building out these platforms in-house or through consortia. **Consortia** represent an efficient way for banks to invest in blockchain technology and build out use cases, as they can split investment costs between members and build a network for adoption.

⁷² Hunt, I. & Mills, C. (2018, January 22). Distributed Ledger Technology—An Emerging Consensus on the Buy-Side. Retrieved from <https://www.ibm.com/downloads/cas/K5JGKJR6>

⁷³ Ibid.

9. Blockchain Technology: Business Use Cases and Adoption

9.1. Blockchain Business Use Cases

9.1.1. Interbank Clearing and Settlements

What is the opportunity? The financial industry is increasingly exploring blockchain as a means of streamlining the transaction clearing and settlement process. Currently, clearing and settlement is dominated by centralized institutions, such as central banks and SWIFT (Society for Worldwide Interbank Financial Telecommunications), which have central counterparty clearing structures. Using blockchain for clearing and settlement application would increase process efficiency and transparency, reduce costs, and get rid of the reliance on a central authority to maintain the ledger.

Why is it beneficial? According to Goldman Sachs Investment Research, facilitating the clearing and settlement process on blockchain technology could improve operational efficiency and save capital markets \$6 billion annually. As every transaction has to be permissioned and must go through central operators, the clearing and settlement process is complicated and expensive. As opposed to using legacy centralized systems to reconcile each financial institution's ledger, an interbank blockchain could keep track of all transactions publicly, and transactions could be settled directly.

Who are the main players? Ripple, an enterprise blockchain services provider, is the most prominent player working on blockchain-based solutions for banks to use for clearance and settlement. R3 is another major player working on distributed ledger technology for banks. In May 2017, R3 raised \$107 million from a consortium of banks including Bank of America and HSBC. Additionally, UBS has launched the "utility settlement coin" project to create a new form of digital cash for clearing and settling financial transactions on a blockchain.

What are the main challenges?

Technology: As blockchain technology is still maturing, there is uncertainty about security and operational issues arising from the technology. The lack of an existing process and infrastructure is also a problem in the short-run. It may still be early to implement this use cases on a larger scale, given that the technology is still unproven and banks are typically more risk averse in adoption new technology.

Costs and Operations: The costs of adopting and implementing a new technology like blockchain may be very costly in the short-term. This is especially true for banks with existing back-office processes and legacy IT systems. Redesigning the settlement and clearing process could come at the expense of considerable capital and running costs for banks. Furthermore, successful implementation of the "lift and shift" migration would require a great deal of collaboration within different divisions in the bank.

Regulation: Regulators are primarily concerned with data integrity, immutability, and privacy issues related to blockchain technology. A robust governance framework is still missing, which deters the widescale adoption of the technology.

9.1.2. Syndicated Lending

What's the opportunity? The business of the syndicated loan market is a popular alternative to corporate bonds that raise funds, and its costs are increasing significantly. Financial institutions are faced with disruption challenges, such as regulatory and compliance requirements of know your

customer (KYC), anti-money laundering (AML) and Bank Secrecy Act (BSA) or new data protection and privacy rules. Financial institutions have looked to streamline this process through digital transformation.

Why is it beneficial? A platform on blockchain technology has the potential to reshape the syndicated loan and capital markets mainly by increasing efficiency and reducing costs, benefiting both banks and clients. Banks can efficiently track the services provided at various stages of the process, such as distribution of fees and charges in the local syndicate banks. Banks reduce the cost of meeting syndicated loan regulatory requirements, by taking advantage of due diligence conducted by others in the syndicate. In addition, since every participating bank has access to the customer's digital documentation, they can avoid data duplication and provide a real-time customer dashboard and reporting. Thus, with blockchain, syndicated banks can immediately provide new value propositions, lower operational risk and costs, and comply with regulations across regions, therefore enabling growth in business and profits.

Who are the main players? Standard Chartered and Bank Itau have started piloting a blockchain-based loan platform in Latin America for syndicated loans, using R3's open source Corda platform.⁷⁴ BBVA and Red Electrica Corporation have become the first businesses in the world to deliver a syndicated loan using blockchain.⁷⁵ Last year, the €150m deal, granted by BBVA, BNP Paribas, and MUFG, was reached in record speed using BBVA's proprietary platform, which is powered by blockchain technology. NatWest has become the first bank to integrate with a new blockchain-based platform to transform and streamline the global syndicated loans market.⁷⁶ In May 2017, Synaps successfully tested a blockchain application for the syndicated loan market. Synaps is a joint venture backed by blockchain startup Symbiont and Ipreo, a financial technology company owned by Goldman Sachs and Blackstone.⁷⁷

What are the challenges?

Technology: Putting the syndicated lending process on a blockchain platform would still require supporting processes, such as Know Your Customer checks, to be conducted before the loan is issued. While there may be another blockchain use case for improving the KYC process, which could potentially be integrated with the syndicated loan process, it is unlikely that these applications will become operational at the same time. To realize the full benefits of blockchain technology, a firm must align its IT strategy across departments.

Risk and Regulations: Making sure the solution abides by all relevant regulation is key to success, as reporting and transparency will be needed by the regulating bodies. Additionally, a distributed ledger is inherently difficult to regulate, in that data can exist in multiple jurisdictions.

9.1.3. Trade Finance

What is the opportunity? The trade finance industry faces inefficiencies that result from paper-reliant processes. For example, according to the report, Role of Trade Finance for Inclusive Growth, Deloitte 2018, finalizing a deal for a commodities cargo by sea can require 36 original documents

⁷⁴ Standard Chartered to pilot industry's first blockchain-based smart guarantees in trade finance. (2018, August 30). Retrieved April 16, 2019, from <https://www.sc.com/en/media/press-release/standard-chartered-to-pilot-industrys-first-blockchain-based-smart-guarantees-in-trade-finance/>

⁷⁵ Fariña, P. M. (2018, November 07). What was the world-first blockchain-based syndicated loan? Retrieved April 16, 2019, from <https://www.bbva.com/en/bbva-signs-world-first-blockchain-based-syndicated-loan-arrangement-with-red-electrica-corporacion/>

⁷⁶ NatWest hooks up to blockchain-based syndicated lending platform. (2018, October 18). Retrieved April 16, 2019, from <https://www.finextra.com/newsarticle/32803/natwest-hooks-up-to-blockchain-based-syndicated-lending-platform>

⁷⁷ Rutenberg, S. A., & Wenner, R. W. (2019, April 16). Blockchain Technology: A Syndicated Loan Revolution?[PDF]. <https://sftp.polsinelli.com/publications/fintech/resources/upd0717fin.pdf>

and 240 copies from up to 27 parties.⁷⁸ The process can take weeks or months to complete. Due to the increase in the risks of fraud and money laundering in trade finance, regulatory bodies have intensified their watch over trading activities. Such regulations include international trade barriers, which further slow the transaction exchange and is inconvenient for stakeholders. Digitizing trade finance using blockchain technology could provide an opportunity for banks to introduce greater efficiency into the complex and outdated trade finance process and achieve cost savings.

Why is it beneficial? Blockchain technology is appropriate to use in the trade finance industry because it is secure, transparent, immutable, and decentralized. Given that trade finance relies on paper and multiple stakeholders, updating the process using blockchain would allow many parties to monitor the operation's progress in real-time and exchange documents in a digital and decentralized way. Additionally, conducting trade finance deals on a blockchain would produce faster transaction speeds, easy and more secure data verification, lower risk of fraud, and a shorter cash cycle.⁷⁹

Who are the main players? Recently various blockchain trade finance networks have emerged that wish to solve the challenges in the trade finance process. One main example is Komgo, a trade finance initiative made up of fifteen institutions, among them international banks, an oil company, a certification company, and trading companies. Komgo has created a platform that facilitates the financing of physical commodities and accelerates industry operations. It is also aimed at improving user's experience as well as turnaround times. Komgo is expected to reduce the cost of transaction and risks associated with servicing and trading to enhance trust and security.⁸⁰ Additional players include the Batavia Platform, Marco Polo, HSBC Trade Finance Platform, Hong Kong Trade Finance Platform, Infosys India Trade Connect, and ICICI Trade Finance Blockchain Platform. Essentially, these platforms help connect the participants in an open trading network and help organizations trade efficiently across borders. The platforms are open, and thus allow new players to enter the trading network and expedite the process that was initially time consuming and expensive.

What are the challenges? A challenge associated with the technology is scalability. The blockchain technology requires many nodes to validate a transaction. Setting up a blockchain system that can handle numerous transactions in the banking industry requires high amount of capital and maintenance costs. Creating standard rules and policies for blockchains is also challenging because it involves transactions between different countries. Moreover, the interoperability of blockchains with other blockchains and legacy systems is a major concern, as it could impede the ability to transact.

⁷⁸ Deloitte (January 2018), Role of Trade Finance for Inclusive Growth, Trends in Trade Finance & Challenges. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/financial-services/in-fs-role-of-trade-finance-for-inclusive-growth-web-noexp.pdf>

⁷⁹ Was, S. (19, January 21). Komgo unwrapped: Financing commodity trade on blockchain. Retrieved April 16, 19, from <https://www.gtreview.com/magazine/volume-17-issue-1/komgo-unwrapped-financing-commodity-trade-blockchain/>

⁸⁰ Blockchain for Commodity Trade Finance: Komgo Case Study. (n.d.). Retrieved from <https://consensus.net/enterprise-ethereum/use-cases/banking-and-finance/komgo/>

9.2. Industry Case Study: JP Morgan⁸¹

The **Blockchain Program at JP Morgan** has been in existence for three years, partnering with different lines of business across the firm to help them identify their blockchain strategies. The program sees blockchain as a disruptive technology that has the potential to generate new business opportunities, reduce costs, and streamline operations.

JP Morgan's investment banking treasury services handles about \$6 trillion in cross-border transactions daily. Therefore, it is no surprise that the bank welcomed the prospects of a technology that enabled people to transact 24/7 globally, almost in real time, and with little operational overhead. The firm embarked on a process to understand how they could use blockchain to reduce reconciliation and streamline operations across their payment processes and other transactions.

The idea came as the new technology leverages cryptography and digital signatures to create an **immutable ledger** between multiple participants where all parties can both read and write data in a shared record. JP Morgan's Blockchain Program spent time working on blockchain both at the protocol level, which is the core foundational standard of the technology, and on applications that run on blockchain. While three years ago, the firm began exploring the Bitcoin blockchain, the Ethereum blockchain was thought to be better suited to model complex financial instruments with unique characteristics and lifecycle events. This was due to its support of smart contracts that enable automation of interest payments, for example.

Privacy and confidentiality were key issues to consider. As blockchain ledgers are public, an enterprise version of a blockchain ledger was required where a public node (key) would ensure record keeping as well as act as an event log, but a private node (key) would ensure that transaction details are not disclosed to unrelated parties.

Quorum: JP Morgan's Open-source Blockchain

In 2016, JP Morgan developed Quorum, an open-source enterprise version of Ethereum. One of the ideas behind this move was "to satisfy regulators who need seamless access to financial goings-on, while protecting the privacy of parties that don't wish to reveal their identities nor the details of their transactions."⁸² Industry feedback from both financial and non-financial institutions has been generally positive. Non-financial firms such as BP have used Quorum components to build an energy trading platform, while other software companies are building a US dollar payment system on Quorum. The open-source code model also welcomes collaboration and public contributions, which enables the technology to continuously develop.

On the business use case side, JP Morgan launched a pilot in 2017 named **Interbank Information Network (IIN)**. Powered by Quorum, IIN allows member banks to exchange information in real-time as a way to verify that a payment has been approved. Historically, correspondent banks communicated one-way, bank-to-bank, but IIN now connects all member banks in a peer-to-peer setup which directly connects all members to a secured encrypted messaging channel. As of 2019, over 180 banks in the Americas, Europe, Asia, the Middle East and Africa have signed up to participate in IIN.⁸³

⁸¹ The following section is based on discussions with representatives from the Blockchain Program at JP Morgan conducted in March 2019.

⁸² Hackett, R. (2018, October 4) Why J.P. Morgan Chase Is Building a Blockchain on Ethereum. Retrieved from <http://fortune.com/2016/10/04/jp-morgan-chase-blockchain-ethereum-quorum/>

⁸³ Largest Number of Banks to Join J.P. Morgan Interbank Information Network. Retrieved from <https://www.jpmorgan.com/global/treasury-services/IIN>

Enterprise-level and Industry Adoption

One key question before any implementation of blockchain is to question whether the transaction has various participants that require access to reading and writing the data. Then comes the business case and the cost of developing the technology in the enterprise setting, cyber security, legal costs and an effort to get everyone comfortable with using the new technology. These costs are compared to what the actual benefits are, cost-saving benefits and even if a business case might not be there, and an analysis is still run to observe and understand what the technology can enable.

The most crucial question is whether the forerunner is in a **good position to drive market adoption**. Even if there is a strong business and commercial case, if participants in the business ecosystem are not incentivized or the forerunner is not in the position to influence the market, the firm will not be able to drive the market to adopt. In summary, for industry adoption the factor of analysis is - does it need blockchain, what is the use case and can a firm drive the market. As a next step, the New Business Initiative Committee, formed by various departments across legal, compliance, operations, technology units, internally evaluates and assesses risks and controls for any new product, offering, or technology going out to the market to ensure that the bank is not subject to any client risks.

Financial Crimes and Risks

Putting aside public blockchains, an enterprise blockchain can be considered a “walled garden”, or a private blockchain where that is run on a permissioned network with a number of banks, custodians, corporate issuers, and asset managers. As a result, regular enterprise risk management practices and techniques can be used to prevent potential financial crimes. As it is a controlled business environment, it also secures the network to ensure that it is economically impossible or very difficult for any other parties to take over more than 51% of the network in the permissioned blockchain space. Hence, a non-public permissioned blockchain will not be likely to create new types of financial crime risks than the ones already commonly known. In regards to anti-money laundering, payments through blockchain probably will not change the existing structure of KYC due diligence.

9.3. Blockchain Adoption and Challenges

During 2018, blockchain spending in the US increased by over 110%, reaching \$1.6 billion. It is forecasted to reach \$3.1 billion in 2019 and \$41 billion by 2025.⁸⁴ Despite a positive growth forecast for Blockchain investments, adoption has been mostly limited to use cases, such as record keeping, smart contracts, and decentralized applications, as opposed to an institutionalized approach. In fact, estimates from JP Morgan suggest the banking industry may still be three to five years away from seeing a meaningful impact from blockchain solutions.⁸⁵ Industries that are paper reliant and whose processes have not been fully digitalized, such as trade finance and processing of loans, have the potential to benefit the most from blockchain. Institutional adoption of cryptocurrencies also remains nascent, primarily due to a lack of confidence in major currencies.

Widespread adoption of blockchain solutions by banks still faces several challenges. **Privacy, interoperability, scalability, and regulatory uncertainty** are among the greatest barriers.⁸⁶ It is difficult for companies to ensure customer **privacy** on public ledgers. However, banks can mitigate this concern by using private and permissioned blockchains, where they can exercise more control over user access to the system and permissions. As a result, enterprise or consortium blockchains

⁸⁴ Research and Markets (2019, March 25). Blockchain in the United States: Forecast to 2025 - Spend on Blockchain is Expected to Record a CAGR of 44.5%, Increasing from \$3.12Bn in 2019 to \$41.11Bn by 2025. Retrieved from <https://bit.ly/2YntVpm>

⁸⁵ Ossinger, J. (2019, January 29). JPMorgan Says Blockchain Is Making Progress Outside Crypto. Retrieved from <https://bloom.bg/2GbMcPx>.

⁸⁶ FinTech Network (2017). Four Blockchain Use Cases for Banks. Retrieved from <https://bit.ly/2oak0U8>

are becoming more commonplace among banks implementing or experimenting with blockchain use cases. Private blockchains require strong interoperability between ledgers.

Interoperability of blockchains with legacy systems and with each other is another challenge that must be addressed. A lack of formal industry standards on distributed ledger technology have hindered interoperability and contributed to fragmented approaches by market players. A standardized approach to the technology would not only facilitate interoperability and a more uniform approach, but also reduce project risk and costs of development, support, and operations, provide clear targets for platform vendors, and address security, data privacy and data governance concerns.⁸⁷ Effective integration of blockchain solutions requires greater collaboration between different stakeholders, and reaching consensus may take time.

Additionally, **scalability** of blockchain-based systems remains a top concern for banks. Contrary to high-performance legacy processing systems which can process tens of thousands of transactions per minute, blockchains can be slow. This is due to the technology's distributed architecture, with multiple processing nodes across different participants. For example, Bitcoin blockchain can process between three to seven transactions per second and Ethereum can process as low as 15 transactions per second.⁸⁸ Expanding blockchain adoption will be difficult without resolving issues of transaction speed and data limits. Developers of distributed ledger platforms are already working to improve blockchain performance and scalability by developing new consensus mechanisms.

Lastly, **regulatory and legal uncertainty** is a key barrier to blockchain deployment. The lack of clarity about the weight and timescale of regulatory change has contributed to reluctance from companies across industries to get involved in this space. The definition of cryptocurrencies, the status, legality, and enforceability of smart contracts, and the immutability and legal requirements for record deletion are among key topics that must be addressed by policymakers. Additionally, questions remain about how current regulatory and legislative frameworks apply to the use of distributed ledger technology in financial markets. Harmonized rules that describe the rights, obligations, protections, and enforcement of laws for both financial institutions and investors with assets on a blockchain could provide greater certainty and guidance for the financial industry.⁸⁹ An extended discussion on the regulatory environment can be found in the next section.

⁸⁷ Deshpande, A., Stewart, K., Lepetit, L., & Gunashekar, S. (2017). Understanding the Landscape of Distributed Ledger Technologies/Blockchain. Retrieved from https://www.rand.org/pubs/research_reports/RR2223.html

Hunt, I. & Mills, C. (2018, January 22). Distributed Ledger Technology—An Emerging Consensus on the Buy-Side. Retrieved from <https://www.ibm.com/downloads/cas/K5JGKJR6>

⁸⁸ Schatsky, D., Dongre, A., & Arora, A. (2018, September 28). Blockchain and the five vectors of progress. Deloitte. Retrieved from <https://www2.deloitte.com/insights/us/en/focus/signals-for-strategists/value-of-blockchain-applications-interoperability.html>

⁸⁹ Hunt, I. & Mills, C. (2018, January 22). Distributed Ledger Technology—An Emerging Consensus on the Buy-Side. Retrieved from <https://www.ibm.com/downloads/cas/K5JGKJR6>

PART IV: RECOMMENDATIONS

Recommendations for financial institution engagement with the crypto asset industry:

- **Develop a core team internally with a deep understanding of blockchain technology and crypto assets.** In a quickly moving industry, developing a team with a holistic understanding of the technology (i.e. technology experts, risk managers, product developers) is crucial for understanding how the industry is expected to evolve and the potential impact on the business. While teams will likely leverage the same core principles around identifying risks, controls, and establishing residual risk, stronger understanding of the technology is needed to define a new governance framework.
- **Continue engaging with regulators, in order to help shape the regulatory landscape.** In the current regulatory environment, it will be challenging for regulators to handle the complexities of new cryptocurrency products that may be under development by financial institutions. Regulators are trying to understand how the technology and new products will work and have been actively engaging with the industry. Financial institutions have the potential to help regulators define regulations that are well informed.
- **Collaborate with other players in the industry through involvement in consortia projects.** Joining project through a consortium may help financial institutions reduce the risk and cost of producing proof of concepts or implementing pilots, as well as create shared industry benefits.
- **Seek opportunities to invest in or partner with cryptocurrency startups,** in order to help advance the development of products or use cases associated with cryptocurrencies or blockchain technology.

Recommendations for risk management and governance of crypto assets:

In light of the numerous risks posed by virtual currency assets, traditional financial institutions that wish to interact with such assets are faced with the challenge of mitigating these risks by revising their current risk management frameworks and processes.⁹⁰ To minimize exposure to these risks, the following steps must be taken by financial institutions:

- Conduct a **comprehensive risk assessment**, which covers the unique risks of cryptocurrencies.
- Ensure that they have **relevant technical expertise** to be able to assess and mitigate risks.
- Incorporate measures that adequately cover the relatively higher level of risk associated with cryptocurrencies into the overall **risk management and governance framework**, especially those relating to financial crime (AML, Sanctions, and Fraud), as well as cybersecurity.

⁹⁰ BIS, Basel Committee on Banking Supervision. (2019, March 13). *Statement on crypto-assets*. Retrieved from https://www.bis.org/publ/bcbs_n121.htm

- Deployment of **blockchain analysis applications**, which screen transactions and their related parties on popular blockchains like Bitcoin and Ethereum, to provide insight into potential financial crime risk.
- Reevaluate **sanction screening** measures to ensure that if the financial institution interacts with cryptocurrency wallets/exchanges, that it verifies real world customer identifying information.
- Revise **transaction monitoring** algorithms and rules to ensure that cryptocurrency specific AML risk is mitigated adequately.
- Publicly disclose, in **regular financial disclosures**, any cryptocurrency exposure or related services in which they are involved.

On April 10th, Wall Street banks answered questions about blockchain and cryptocurrencies during a US House Committee on Financial Services hearing.⁹¹ With respect to cryptocurrencies, bank CEOs highlighted their cautious approach towards the industry. Goldman Sachs CEO David Solomon noted that “like others, we are watching and exploring and doing work in terms of trying to understand the cryptocurrency market as it develops.” Other CEOs noted a lack of regulatory clarity as a major hurdle, as there is no certainty that the technology will work or be viable long-run. However, despite the developing regulatory landscape and current stigma around cryptocurrencies associated with financial crime concerns, there are still actions financial institutions can take to navigate this nascent market carefully.

⁹¹ Hearing: Holding Banks Accountable: A Review of Globally Systemically Important Banks 10 Years after the Financial Crisis