Application of Blockchain Protocol to Wealth Management

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Professional wealth management dates back to the 16th century. Since then, multiple legacy systems have evolved for service delivery, some in response to client demands. Today, at the core, customers expect clear communication from advisors on (1) investment goals, (2) expected returns, and (3) associated risk. Going forward, clients may demand technology-embedded services including digital production and communication delivery systems. Blockchain protocol is a promising new technology that applies to wealth management.

Wealth management institutions are diverse in size, ranging from divisions of the largest global financial institutions to small, independent firms. Regardless of their size, wealth management service providers rely on technology to varying degrees.

Global banking institutions have engaged in developing blockchain applications. Some (e.g., UBS) are working toward developing internal protocols. Others have joined consortia in joint application standards (e.g., the R3 consortium and the Enterprise Ethereum Alliance), and still others have established startups to pursue protocols to their specifications (e.g., a new company formed by blockchain startup, Symbiont, and Ipreo, a fintech firm co-owned by Goldman Sachs and private equity giant Blackstone).

Interestingly, some of the largest global and domestic banks that are frontrunners in blockchain efforts are also the highest-ranked wealth management institutions, according to a 2017 survey by Euromoney (Exhibit 1). UBS is the top-ranked global wealth management firm. Among US banks, JP Morgan and Citi are among the top 10 globally.

From the survey data, it is evident that the largest banks have adopted the blockchain, and because they operate major wealth management divisions, it is safe to assume that the blockchain protocol is coming to their wealth management operations soon if it has not already. Of course, the industry is very diverse in size, and many smaller institutions across the country offer services that use advanced technologies (e.g., LearnVest).

Going forward, wealth management entities of all sizes will face major restructuring challenges. Rapid advancements in information technology (IT) over the past two decades have accelerated changes in the wealth management operating infrastructure, the role of the advisor, and client expectations. For the service provider, technology helps in delivering better and faster service; for customers, technology provides access to information sooner and at their convenience—anytime, anywhere, and on any device. Technology also reduces onboarding, back-office costs, and information gathering and advising expenses.

EXHIBIT 1

Best Private Banking and Wealth Management: Global Survey 2017

Rank	Entity	Previous Rank
1	UBS	1
2	JP Morgan	3
3	Credit Suisse	2
4	Citi	4
5	Julius Baer	7
6	Pictet	9
7	BNP Paribas	5
8	Deutsche Bank	6
9	Santander	11
10	HS	8

Note: Best private banking and wealth management overall were determined based on the following variables: net-worth-specific services, asset management, investment banking capabilities, commercial banking capabilities, family office services, research and asset allocation advice, philanthropic advice, socially responsible investing/social impact investing, international clients, succession planning advice and trusts, innovative technology—client experience, and innovative technology—back-office systems.

Source: Euromoney (2017).

Today, service providers face advisor fee compression. Furthermore, improvement in the quality of advice and responsiveness to client demands is expected.

Two decades after the introduction of the Internet, its use has moved from the delivery of information to the delivery of value (Tapscott and Tapscott 2016). The development of the Internet has led to advances in technology in many directions. One such development is distributed ledger technology and its best-known version, blockchain. This article explores the application of blockchain to wealth management for the front-, middle-, and back-office operations.

The remainder of this article covers the future trajectory of wealth management services, an introduction to blockchain protocol as a new technology, the application of blockchain to the wealth management service delivery, and an evaluation of whether blockchain is suitable for wealth management. To gauge how significant the role of blockchain will be in the coming years, this article also examines trends in investments in blockchain. The fact that blockchain continues to attract enormous investments bodes well for its application layers, such as wealth management.

THE FUTURE OF WEALTH MANAGEMENT ADVISORY SERVICE

Advancements in technology, the globalization of the economy, and rising wealth among populations in emerging countries promise to increase the flow of funds into wealth management institutions. In 2016, global household assets amounted to $207 trillion, and they are estimated to grow to $296 trillion by 2021, with US households having over 50% of the total (Roubini Thought Lab 2016). The increase in household wealth will similarly increase assets under management. However, for advisory service providers, there are challenges resulting from changes in demographics. For example, millennials, who are more technology savvy and less bound by traditional banking relationships, may expect different systems for establishing an account, managing risk, IT, and sales.

Banks in general and wealth management companies in particular have a long tradition of being relationship businesses. They have used technology mostly for streamlining back- and middle-office tasks. In their interactions with clients, at best, they have used technology to offer 24/7 account access. Their value proposition has remained providing the best advice and retaining personal relationships.

To examine the changing environment in wealth management, Roubini Thought Lab (2016) conducted a survey of 2,000 investors and 500 investment providers in 10 leading markets in North America, Europe, and Asia-Pacific. According to the survey, by 2021, investors will require access anytime, anywhere, and on any device; an omnichannel experience; and the sophisticated use of technology. As new generations of clients come into the market, they may require extensive digital services not only in back- and middle-office operations but also in their interactions with service providers in the front office. Their loyalty is likely low; they may quickly switch service providers for a better offer or because of perceived technology deficiencies. Most alarming to investment advisory professionals is the finding that 48% of investors would be willing to switch providers if providers did not meet these demands; for millennials, this figure is a staggering 65%.

Investments in the procurement of new technologies vary around the globe. According to a report by Globerman (2016), the North American, European, and Asia-Pacific regions' wealth management industries

spent $5.7 billion on IT in 2016. The report also suggests that the North American and European regions invest more in the front office than the Asia-Pacific region does.

Adding new technologies to wealth management practices will provide clients with a variety of choices, among them access to account information and the ability to manage their portfolios, execute their financial transactions, and interact with financial advisors in tracking their portfolio performance toward their life goals. The acquisition of new technology will help service providers reduce operating costs and expand their client base, resulting in increased revenues.

Among wealth management advisors, larger institutions tend to build their systems internally, and smaller entities either rely on software and expertise offered by external enterprises or outsource their needs. Either way, incorporating the technology into the wealth management advisory business is essential.

Currently, wide-ranging technologies are available to wealth management advisors, including robo-advisors, artificial intelligence (AI), and blockchain. Robo-advisors use a simple model based on client age, goals, and risk tolerance to select a portfolio of exchange-traded funds and other instruments. The more sophisticated AI depends on a protocol that uses much more data, beyond those of the clients, to devise investment choices. The data used may include information on various industries, markets, and events. The portfolio managers then analyze the AI data to make final decisions. Blockchain provides a range of choices to both clients and advisors: Clients can buy, sell, and transfer assets and record their ownership independently or through advisory firms. Using the technology, service providers can reduce the cost of their operations. Overall, blockchain promises lower transaction costs compared to traditional protocols.

UNDERSTANDING BLOCKCHAIN

Lacity and Maloney defined blockchain as follows:

> A blockchain is a decentralized, peer-to-peer system for validating, time-stamping, and permanently storing transactions on a distributed ledger that uses encryption protocols to authenticate asset ownership and consensus protocols to add validated transactions to the ledger and to ensure the ongoing integrity of the ledger's complete history. Some blockchains also use smart contracts that apply rules to execute transactions based on pre-agreed conditions automatically. (2017, 32)

To understand blockchain, let us go back and review how the Internet started. The Internet began in 1969 and was further developed in the 1970s and 1980s by the US military and academic researchers as a global network of millions of computers to exchange information. The original Internet was an open-source protocol wherein data moved among multiple computers connected to a network, and all the networks combined became the Internet. Two decades later, the World Wide Web (web) was built on the Internet to create databases in certain formats accessible by clicking on their hyperlinks. Web applications such as browsers made access to the web easier. The web provided entrepreneurs, including the founders of Google, Facebook, Twitter, and others, the opportunity to build applications to centralize and share data.

Although the original Internet was an open-source protocol, applications, such as Google, built on the web were no longer free because they operated as commercial entities using consumer data to sell advertising space. The downside of all this happens to be the lack of data security, trolls, and other hacking schemes. Identity theft has become a major problem, causing enormous costs for millions of people. Among other things, blockchain promises to mitigate the security problems currently embedded in the Internet.

Introduced in 2008 as the infrastructure behind Bitcoin, blockchain provides a peer-to-peer exchange mechanism without a central intermediary intervention. Although Bitcoin and other cryptocurrencies have received much attention and their ultimate fate remains unknown, blockchain remains much more promising as a protocol not only for the payment system but also for a variety of other transactions and exchanges. Blockchain's peer-to-peer system allows for the exchange of information, messages, and assets to take place faster, more securely, and at significantly lower costs.

The blockchain is a new way to record and store transaction data and is therefore similar to a typical ledger. It works through an asymmetric encryption algorithm in which the key used for encryption differs from the key used for decryption. A key pair enables two

parties to exchange something of value anonymously. As such, there is a cryptographic private key that is only available to the owner and a corresponding public key that is open on the network. The public key is used to (1) encrypt information that only the respective private key can decrypt, (2) validate a digital signature by the holder of the related private key, and (3) conduct a secret transaction between two parties. The private key provides access to its corresponding public key and creates a digital signature to verify the identity of its owner.

Let us look at a simple example of two people who wish to exchange a message anonymously. The sender and the receiver have two objectives: first, to ensure that only the designated receiver sees the message; second, to ensure that the receiver can verify the identity of the originator. With this in mind, the sender and the receiver exchange their respective public keys. The sender then encrypts the message using her private key to create a digital signature, then re-encrypts the message into the receiver's public key before sending it. Once the receiver obtains the message, he can use his private key to decrypt the message on his public key. He uses the sender's public key to validate her digital signature. At this point, both the originator and the receiver have met their objectives. This simple example can be extended to include the exchange and storage of any number of digital assets.

How does one acquire a key pair? The key pair comes with a wallet acquired through downloading software on a device such as a desktop, a mobile, or USB hardware. The wallet stores the key pair used in sending or receiving messages, cryptocurrencies, or other assets.

Beyond this simple example, let us see how blockchain can perform the functions of a trusted third party (i.e., a financial institution) without actually being one. The blockchain must address the following: how to verify that the person initiating the transaction has the necessary funds, how to ensure the targeted person and no one else receives the funds, and how to ward off double spending.

Concerning the first problem, the asymmetric cryptographic system in blockchain would show that the sender is the right person whose digital signature is verifiable through the corresponding public key, as is the availability of funds. The second concern is moot because redirecting funds to someone else requires re-encrypting the initial message, which is impossible because no one else has access to the sender's private key. Finally, the sender's double spending is impossible because, for the second transaction to be valid, it has to go through and be added to the block, as the first transaction was, and the miner who handled the first transaction would not allow this to happen.

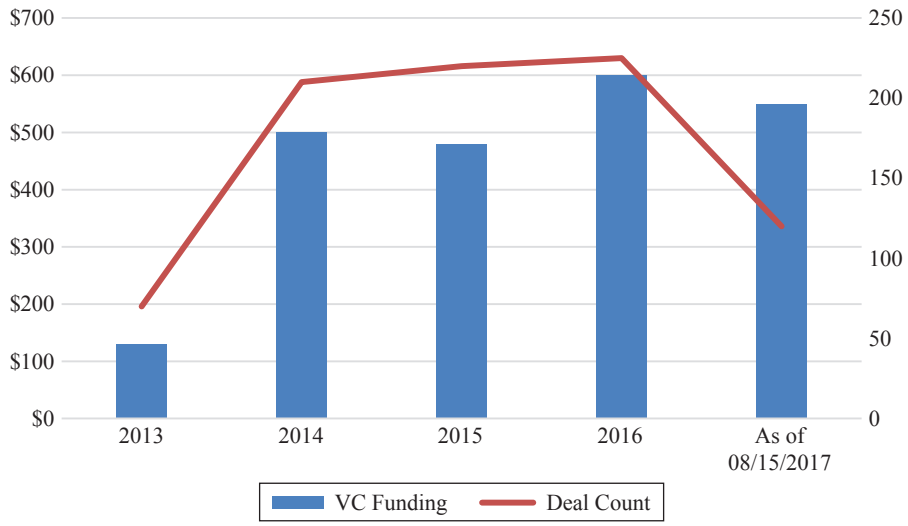
Blockchain could either be unpermissioned, which allows it public access, or permissioned, which allows access only to known parties. Occasionally, regulators may also serve as permissioned parties. In the wealth management environment, a permissioned blockchain is most likely.

BLOCKCHAIN AND WEALTH MANAGEMENT

At its best, blockchain can help wealth managers to (1) reduce costs, (2) extend client services, and (3) ease compliance burdens. Cost savings may come from shared data, messages, and documentation. For example, the cost of onboarding can be significant because it may take many days or weeks to assemble an extensive array of data, including proof of identification, residency, occupation, marital status, and sources of wealth, among others. The client may have already generated the information for another office within the same bank or another entity outside the bank. Instead of regenerating the information, the client could store the information on the blockchain and directly provide permission to the wealth manager to access the data. The wealth manager or the client may also post messages on the blockchain for the exchange of additional data.

Additional cost savings can come in asset management, which comprises a large segment of the functions of wealth management. By one estimate, asset management could see more than one-half of its operating expenses affected by blockchain (Wyman and Morgan 2016). Specifically, use of blockchain can produce cost savings in aggregating, sharing, and amending data; in brokerage; and in the clearing and settlement of payments. In the United States, the Automated Clearing House (ACH) processes most payment clearing and settlement functions. It takes ACH one to three days or longer to settle payments. In contrast, blockchain can handle the same task in real time. A faster payment system can reduce settlement liquidity risk and provide for the more rapid redeployment of capital. The Federal Reserve is keenly interested in technologies that provide prompt payment clearing and settlements, including blockchain (Arshadi, forthcoming).

EXHIBIT 2
VC Funding in Blockchain



Source: PitchBook (2017).

At the front office, blockchain could assist wealth managers in providing new value-added services to their clients. Having access to real-time data, including risk-adjusted asset pricing, customers can follow the performances of their portfolios toward their goals. The faster settlement of payments through blockchain can reduce liquidity risks through a reduction in counterparty risk. The faster settlement also makes funds available sooner, providing an opportunity for the earlier redeployment of capital for a potential increase in returns. Blockchain enables wealth managers to offer an array of new digital products using smart contracts, which provides for automatic execution of transactions based on pre-agreed parameters (Szabo 1994). Blockchain can provide up-to-the-minute investment data and information on the associated risks to clients, who, in turn, may want to discuss it with their advisors.

Regulatory compliance through legacy systems may require substantial time and resources, although data storage has significantly improved in recent years. The ongoing monitoring of profiles is simplified through blockchain, creating an alternative to audit trails and easing anti-money-laundering efforts.

As blockchain assists in reducing costs and potentially increasing revenues, the ultimate beneficiary is the client. Wealth managers would also benefit because they would succeed in the competitive market against those who do not use the technology: With new entrants into the marketplace, clients would prefer service providers who use state-of-the-art technology, including blockchain.

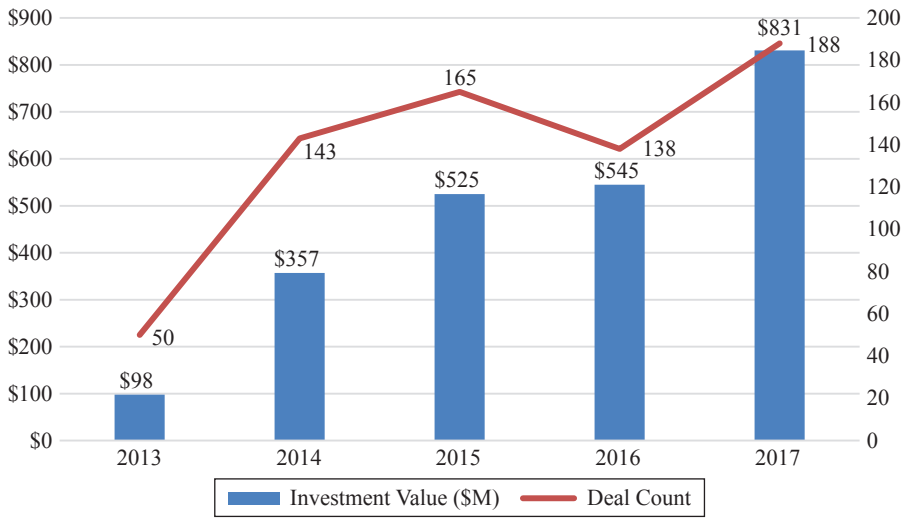
Blockchain continues to develop in its core infrastructure and applications. Although currently there are no separate data on funding for the blockchain wealth management layer, financing for all blockchain-related projects demonstrates the significance and endurance of the technology. In recent years, there has been substantial funding for blockchain from the financial community, including venture capital (VC), private equity, and the initial coin offerings (ICOs). Blockchain infrastructure funding supports computing and storage facilities. Application-layer funding provides opportunities for wallet software, various payment products, and blockchain enterprise services (e.g., wealth management).

VC support for blockchain has primarily focused on applications, except for a few with a clear objective of operating within blockchain space (e.g., Blockchain Capital, Andreessen Horowitz). Exhibit 2 presents VC funding from 2013 through 2017. In the first three quarters of 2017, VC firms invested $550 million in blockchain projects through 125 deals.

Equity funding is a source of funding for blockchain-related enterprises focused on infrastructure. The level of funding and the number of deals have either

EXHIBIT 3

Annual Equity Investment and Deal Count in Blockchain



Source: CBINSIGHTS (2017).

remained steady or have increased modestly over time. Exhibit 3 presents data for equity funding during the 2013–2017 period. The estimated 2017 funding was $831 million through 188 deals.

The third and by far the largest source of funding for blockchain is ICOs. ICOs are a form of crowdfunding in that investors provide funding and receive something of value in return—namely, tokens. The process begins with entrepreneurs setting up a website and issuing a white paper explaining the project, the expertise of the founders, and the timetable for raising funds. If the ICO is successful in raising funds, the tokens will be listed on a cryptocurrency exchange. After a lockup period (e.g., one month), the original investors will have an opportunity to sell their tokens through the exchange, and new investors can buy the tokens. Compared to equity funding, ICOs capture two functions at once: VC and initial public offering. Similar to equity funding, token prices may gain or lose value depending on the performance of the underlying project.

After being introduced in 2013, ICOs have grown rapidly. As of the end of 2017, blockchain enterprises had raised more than $2 billion through ICOs. During the same period, blockchain-related companies raised $550 million from VC firms and $831 million through equity investments. Exhibit 4 demonstrates blockchain equity versus ICO funding. Since the beginning of 2016, quarter by quarter, equity investments have remained stagnant while ICOs have increased substantially. This pattern is similar to VC funding for blockchain-related projects.

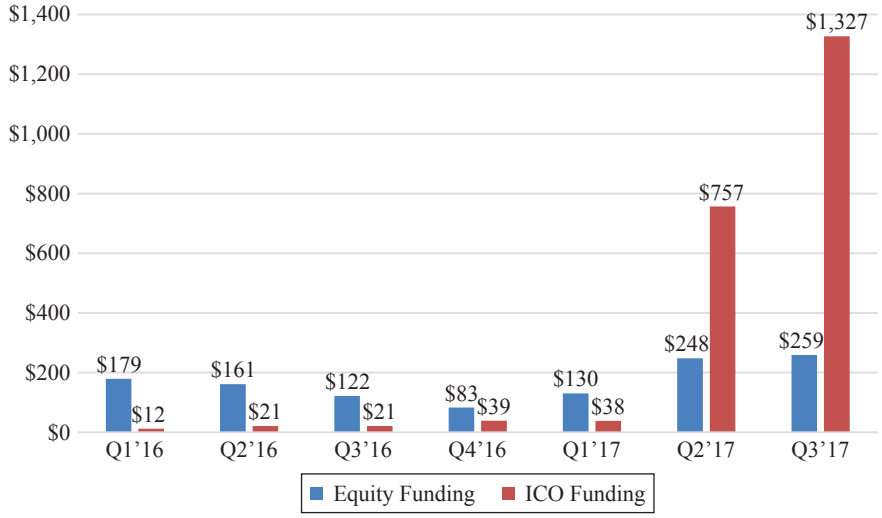
IS BLOCKCHAIN SUITABLE FOR WEALTH MANAGEMENT?

Application of the blockchain platform to wealth management faces major challenges. There is a technology-embeddedness challenge, in which blockchain technology needs to be assimilated within existing complex institutional settings. The IT mindset in wealth management companies tends to focus on producing and storing back-office data and minding middle-office information. Blockchain has a completely new set of technological demands and shifts in mindset that may not be within the comfort zone of the IT department (Lacity 2018).

Regulatory issues are another block of unknowns. As the permissioned-blockchain platform evolves with the capacity to provide full blockchain access to regulators, uncertainties remain regarding how regulators may use such an entire set of information. To stop money laundering through wealth management firms, regulators are rightfully interested in client records. However, access

EXHIBIT 4

Blockchain Equity Funding vs. ICO Funding



Source: CBINSIGHTS (2017).

to a whole set of data could be of concern to clients and, therefore, to their wealth management firms.

Security remains an issue, as indicated by media publicity on cryptocurrency fraud. Although permissioned blockchain should not be as prone to such problems, the perception remains of the risk of the unknown.

The permissioned blockchain platform mitigates problems in governance issues that are present in the unpermissioned blockchain. It can also solve the problem of the lack of industry standards.

Despite these challenges, for the time being, there are opportunities for major cost-cutting in the application of blockchain in back- and middle-office operations. Currently, tens of thousands of people match trades, settle transactions, conduct research, and manage portfolios. Such functions cost an enormous amount of money and are subject to human errors. Introduction of blockchain to those functions can save in costs and eliminate human errors.

As wealth management firms acclimate to blockchain technology, they may realize that front-office operations can also benefit, as new technology-savvy clients demand hands-on, expanded services available through blockchain. This will be the second phase of the blockchain application if the operational side shows positive results. Application of blockchain will not fully replace the value of the client advisory function, however; for centuries, clients have relied on advisors for their expertise in front-office tasks, including advice on investments, risk management, and retirement planning, among others (Reamer and Downing 2016). Such expertise will remain alongside the efficiencies the new technology brings to the fold. Blockchain may also enable the supply of new products to clients who would require the expertise of professional advisors.

The timing and the logistics of blockchain applications to wealth management will depend on the size of the wealth management entity. Large wealth management institutions may develop their permissioned infrastructure internally, where select employees and clients have access to its network. Small and medium-size entities may acquire blockchain enterprise software and expertise from outside vendors. The timing of such a conversion remains to be seen, but considering how fast the technology is developing, it will not be too long.

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