Blockchain Payment Systems

Sustainable Earnings Driver Or Misuse Of Capital?

Elwood Research Series

09 December 2019
About Elwood Asset Management

Elwood Asset Management ("Elwood") is an investment firm specialising in providing institutional investors with exposure to digital assets and blockchain technologies.

The Elwood Blockchain Global Equity Index aims to offer exposure to listed companies that participate or have the potential to participate in the blockchain or cryptocurrency ecosystem. The index aims to capture the potential investment upside generated by earnings related to the adoption of blockchain technologies or cryptocurrency. It is designed to evolve with the future development of the blockchain space.

The index is independently calculated and distributed by Solactive and is reviewed and rebalanced quarterly.

Invesco has partnered with Elwood to launch an ETF and a Japan domestic mutual fund that aim to deliver the performance of the Elwood Blockchain Global Equity Index by physically investing in the index constituents.

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Investment Fund

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Contacts

- www.elwoodam.com
- block@elwoodam.com
- twitter.com/Elwood_AM
Abstract

In this report we analyse the strengths and weaknesses of both traditional and blockchain-based payment systems. We conclude that, while some advocates seem to tout blockchain as a panacea, the actual impact is mostly restricted to situations where blockchain technologies have the potential to significantly lower the costs of auditability, security and governance.

Blockchains may be slower and require more computational resources than centralised computer systems, but can outperform incumbents which suffer from inefficiencies due to a lack of competition and/or a challenging regulatory landscape. In some cases, blockchain payment systems can offer services at price levels which are not commercially viable for traditional payment systems.

The ability to identify the right problem domains where blockchain technologies are suitable solutions is crucial for corporates intending to capture the benefits. Corporates which fail to appreciate the nuances may embark on ill-conceived blockchain projects and end up destroying shareholder value, while those that do and have other competitive advantages such as scale could potentially generate significant shareholder value over the long term.

Companies Covered

<table>
<thead>
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<th>Ticker</th>
<th>Company</th>
<th>Market Capitalisation (US$m)</th>
<th>Elwood Blockchain Score</th>
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(Source: Elwood research, Bloomberg)

Note: Scores range from 1 [potential] to 5 [core] according to each stock’s capability to generate sustainable earnings related to blockchain technology; pricing data as of 28 Nov 2019

Background

Financial transactions are a core part of our society. Since the creation of currency and banking, the way we transact with each other has been through continual transformation. In some circumstances today, in order to comply with arcane conventions, payments still require layers of bureaucracy which results in lengthy delays of days or even weeks. We believe blockchain technology has the potential to shake up some segments within the payments space, to change the way parties without a trust relationship exchange wealth and to greatly reduce the need for financial intermediaries, a key component of payments set-up today. In the Elwood Blockchain Global Equity Index, we classify 18 companies as members of the Blockchain Payment Systems business area, four of which are evaluated in this report. We also analyse the impact that blockchain payment systems are likely to have in society and go through the key initiatives by the main players in this space.

Going cashless is an irreversible trend

Every day global financial systems process billions of payments ranging from trivial grocery shopping to larger interbank transactions. Cash is still the preferred means of payment globally, with 85% of the population using it as opposed to 15% transacting via non-cash methods. But in some geographies, such as North America, East Asia and Western Europe cashless transactions already account for a third or more of all payments.
In the figure below, we show that Northern Europe is the leading region for cashless payments with the US, Australia and South Korea closely behind. However, large parts of the world remain heavy cash users such as Southeast Asia, Southern Europe and Latin America.

**China is seeing a recent cashless boom**

In recent years, China has been leaving cash behind and seeing a boom in cashless transactions. According to the Bank for International Settlements (BIS), the volume of non-cash transactions has grown more than tenfold in the last seven years, from 16 billion transactions in 2012 to 188 billion in 2018. Mobile payment has played a significant role in this growth, having become ubiquitous across the country and responsible for CNY 190 trillion in transactions in 2018. The largest player, Alibaba, reported 1.2 billion annual active users on its payment platform Alipay, of which 900 million are based in China alone (September 2019).
Sometimes, electronic money is not a choice but a necessity

Some regions suffer from unstable governments and currencies, with violent fluctuations in FX exchange rates during periods of crisis. As a result, some people resort to cryptocurrencies as an alternative “store of value” and “medium of exchange”, especially when governments have a history of restricting access to foreign currencies, such as Argentina.

Global and Argentina Bitcoin trading volume growth (%yoy, 3-month moving average) vs. USD/ARS

There are other well-known cases of people resorting to cryptocurrencies in times of crisis, for example Venezuela where the unavailability of local currency has forced people to switch to cryptocurrencies, and Hong Kong where political instability has left people questioning the underlying value of the local currency (HKD).

The payments market has seen little competition in the last decades

Until recently, the payments market was fairly concentrated, with large credit card companies dominating global markets and only regional players providing some competition (e.g. EC in Germany, Cielo in Brazil). Credit card charges usually range between 1% and 3% but could be higher depending on the perks and/or global acceptance.
More recently, with the increasing development of online shopping and the rise of digital banks, this dominance is being challenged. However, the number of players is still relatively small and charges are still well above 1% of transaction value despite the cost to payment providers is usually less than 40 basis points.

**International transactions are slow and cumbersome**

Switching to cross-border markets, we observe that international payments costs are high and can become considerably more expensive as transaction notionals decrease. This is because the current international payment setup consists of a number of financial intermediaries, and a large proportion of transactions still require human input. The international wire system relies on correspondent banks which are banking institutions that provide financial services on behalf of other banks not based in the destination country. Most international transfers are done via SWIFT (Society for Worldwide Interbank Financial Telecommunication), through which the correspondent banking relationships are established.
In the example above, banking fees are charged across the whole transaction path. Both payer and payee banks charge transaction fees as a percentage of funds and/or a fixed fee. When the payment order reaches the correspondent banks, both of them charge correspondent banking fees, and also an FX conversion fee at correspondent bank B’s end. As it becomes clear, the whole process is expensive and time-consuming. Some banks such as Lloyds in the UK demand up to four days for funds to be transferred to certain countries.

**High transaction costs have a large impact on the less well off**

One type of customers most affected by high international transaction costs are vulnerable families reliant on remittances from abroad. In 2018, workers in developed countries sent $526bn back to their families in their home countries, up 8.6% on 2017 and representing an 11% CAGR in the last 20 years.

![Value of remittances sent over the last 20 years ($m)](Source: World Bank, KNOMAD)

These amounts represent a crucial lifeline to many families in the developing world, reaching over $70bn in countries like India and accounting for around 30% of total GDP in Haiti, Nepal and Tajikistan.

**Cost of sending money abroad is still double the UN’s target**

Yet, remittances still suffer from high international transfer costs. In the first quarter of 2019, the cost of sending $200 to low and middle income countries was c.7% of funds, more than double the UN’s Sustainable Development Goal target of 3% (by 2030). Costs are higher in Africa and some Pacific islands and are driven mainly by high processing fees and foreign exchange margin requirements as a result of illiquid or volatile currencies.
New market entrants such as Revolut or TransferWise have been able to reduce cross-border transfer costs to c.1% of funds and generally provide better FX rates than traditional banks. However, these companies require users to have banking infrastructure which sometimes is lacking on the receiving side.

**Blockchain can help expand the provision of financial services in less developed areas**

Despite increased complexity and IT infrastructure demands, blockchain technology and cryptocurrencies work the same way in domestic and cross-border transactions, meaning that they could pose an option to people without access to banking services, mainly in developing countries. This option is particularly compelling if the blockchain-powered wallets are made available on mobile devices.
According to the World Bank, 1.75 billion adults globally still don’t have access to banking services, mainly due to having too little funds to justify bank accounts and the associated fees. The population without access to banking services predominantly live in developing countries, with over 50% of the unbanked living in 10 countries.

Despite giving low financial resources as a reason not to own a bank account, the unbanked population could still benefit from online transactions such as receiving money from abroad and making small payments. With the lowest Bitcoin unit, the Satoshi (10⁻⁸ BTC), being worth less than a hundredth of a dollar cent (November 2019), remittance companies could make use of blockchain technologies such as Bitcoin to allow money transfers of any amounts, reducing exposure to volatile, scarce or illiquid currencies present most times in developing nations.

Blockchain as an alternative for payments

We believe blockchain can be useful in payments. Traditional money wire methods rely on a central counterparty (e.g. a clearing house) which records and ensures that asset ownership is properly allocated. This is required because only the central counterparty has access to the master ledger of transactions. In the case of international transactions, further complexity is added by correspondent banks. These layers of usually large institutions and legacy systems dramatically increase cost and slow down transaction speed.

Blockchain-based systems work differently due to the distributed nature of the master ledger: each transacting party (e.g. banks, brokers, individuals) has access to the master ledger and can audit it independently. Assets are represented and distributed as cryptographic tokens which are immutable and secure by design.

Blockchain introduces new technical challenges in the transactions space

Contrary to popular belief, blockchain is unlikely to provide solutions to all money-related problems and has significant technical limitations. In fact, its distributed nature adds complexity which can lead to increased IT costs, lower transaction throughput and slower payment propagation, when compared to a single well-structured traditional database system.

Impact of using blockchain on transactions

Higher IT costs

The distributed nature of blockchain implies that many copies of the master ledger must be stored among parties. These parties need to 1) download, 2) validate, 3) store and 4) relay transaction data in order. Additionally, since the transactions are commonly packed into blocks, the processing steps effectively have to be done twice: once when they...
are new transactions in raw format and again when the transactions are contained inside blocks, although new technologies like “compact blocks” can mitigate this problem. These four processing steps may ultimately lead to higher IT costs than the traditional infrastructure:

- Steps 1 and 4 above may require high network bandwidth. In the Bitcoin network for instance, miners are nodes with a very specific role: update the public ledger by pack new transactions into blocks. Miners compete to update the public ledger by trying to build their own block proposal. Having a faster and more reliable Internet connection than the competitors is vital to maintain a timing advantage, even if this advantage equals to few milliseconds.

- Step 2 requires increasing computing power and thus increasing power consumption for the validation of the transaction data. Moreover, technologies like Ethereum offer smart contract platforms, which require all network participants to execute high-level non-optimised sets of instructions inside virtual machines.

- Step 3 requires significant storage capabilities. The public ledger is an ever-growing data structure. For instance, according to Blockchain.com, the Bitcoin blockchain size was 188,774 MB on 1st Nov 2018 and 247,177 MB on 1st Nov 2019, with an increase of 31% in one year. As shown in the graph below, assuming an approximately constant transaction size, we can observe a very high correlation between the cumulative number of transactions and the total blockchain size. Since nodes may need to access transactions validated a long time ago, fast access to historical data has to be fulfilled in the face of growing storage requirements. If a blockchain payment system manages to achieve high transaction throughput, such as one a large corporate remitter would require, storage requirements will increase considerably.

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Blockchain size and the cumulative number of transactions in Bitcoin
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![](blockchain_size_transactions.png)

(Source: blockchain.com)

**Lower transaction throughput**

The increased complexity, data requirements and parties in verifying and validating transactions leads to a reduction in transaction throughput capacity in blockchains. Scalability is considered the most challenging issue of current
blockchain architectures which strive to achieve mainstream adoption. For instance, in the Bitcoin network, the throughput is driven by 1) the proof-of-work consensus protocol, which controls the frequency of the creation of new blocks of transactions, and 2) the block size, which decides the maximum number of transactions that can fit in a single block. Increasing the block frequency and the block size may result in a higher throughput, however network delays can cause synchronisation issues between the nodes and the formation of temporary concurrent blockchains (known as forks) with a higher probability. These issues would compromise the very nature of the consensus protocol.

Potential advantages include increased security and indirect cost reduction

- **Better resilience:** The decentralised nature of blockchain significantly reduces or even removes the risk of a single point of failure.
- **Better auditability:** As all transactions are recorded in the blockchain, auditing can be decentralised and performed by anyone holding a copy of the master ledger, significantly increasing transparency. While transparency is an option in centralised systems, as the data could be published by the maintainer, a blockchain ensures that data must be public.
- **Better security:** Because transaction ordering may be performed by a majority of parties, it is less prone to fraud and collusion, thus increasing security.
- **Reduced legal requirements:** As validation is built-in by design, blockchain systems may prove far more efficient in terms of governance. The time, human and financial resources employed by a large number of institutions (banks, regulators, law enforcement, courts) to mediate disputes can be reduced, leading to lower legal and oversight costs related to financial transactions.

Transaction speed

We believe a similar argument is valid for transaction speed. In traditional centralised systems, data flows between users and a central database, resulting in fast data propagation (e.g. domestic deposits appearing at near real-time at the payee’s account). In blockchain systems, data flows between payer and payee also within seconds, but settlement (irreversibility) may build up only gradually over time as the transaction gets recorded within a block. As a result, blockchain transactions propagate more slowly than transactions in traditional centralised systems.

However, when comparing blockchains against established systems, one must note the disruptive potential. Traditional payment systems work as a chain of centralised systems, with various centralised players communicating and transacting with each other in order to guarantee a smooth and reliable flow of data between individuals and institutions. Whilst they work very well and efficiently as single units, interactions between each other are prone to delays due to various legacy and regulatory reasons, which becomes evident in international transactions sometimes taking several days to clear. In this respect, we believe blockchain has an opportunity to replace several centralised systems with a single decentralised ledger, increasing robustness and security.

Challenges and opportunities when investing in blockchain

In a few niche areas, where trust minimisation (i.e. reduced vulnerability to harmful third-party behaviour) is key, the blockchain may provide a sustainable competitive advantage. These companies may have unique scale (have large customer base, handle a significant number of transactions) and unique technological understanding (experienced tech-savvy staff). In the following two sections we go through: 1) examples of how some companies poorly apply blockchain technology in their operations, destroying shareholder value, and 2) how companies we have identified in the Elwood Blockchain Global Equity Index are generating shareholder value in this area.
Corporates with a weak blockchain understanding are likely to waste shareholder capital

In what could be described as an effort to be seen as cutting-edge technology adopters or perhaps a naïve approach to capital allocation, some corporates fall into the trap of using blockchain technology based on misconceptions about its characteristics and capabilities. It is true that blockchains may be more efficient than systems based on physical records, however in our view this is often a spurious comparison to make. We believe comparing blockchains to modern centralised electronic database solutions would be more appropriate, and this is where blockchains are considerably less efficient. Blockchains may only be useful as a tool to reduce governance costs, eliminate the need for trust and to make data records more resilient in the face of attackers. Corporates applying blockchains in scenarios where these problems do not apply are likely wasting shareholder capital.

Despite this, the corporate world has become rife with companies enthusiastically announcing their latest blockchain investments, only to drop them a few months later after realising the projects were infeasible or not meeting the expectations. Below we show three examples of how corporates have misapplied blockchain in their operations.

**BHP Billiton: “Rockchain”**

In July 2016, R. Tyler Smith, the company’s Head of Blockchain, announced that BHP would be using blockchain technology to “record movements of wellbore rock and fluid samples and better secure the real-time data that is generated during delivery”. At the time, the company expected the project would deliver efficiency gains and better integration with partner companies and used its global and decentralised presence to justify using blockchain for improved data sharing.

The solution reportedly runs on the Ethereum network and has been built by blockchain start-up BlockApps, whose case study states that, with the application, geologists can enter and track information on the location of mining samples within a single source. If that is truly the use case, it can be easily achieved with cloud-based document management solutions. In our view, deploying the resources to build a rock tracking application on the blockchain is
more akin to poor allocation of capital, which does little other than to enable the management team to use the latest buzzwords, rather robust decision-making.

The venture was unsuccessful - Smith left BHP shortly after the announcement in April 2017 to join ConsenSys as a director in “Energy and Consulting”, with his LinkedIn profile stating that he helps “Energy companies experiment and build Blockchain applications”. In addition, there are no recent mentions of the project by the company and the “Head of Blockchain” position at BHP seems to no longer exist.

**Walmart: Lettuce tracking**

After dozens of people got sick in the United States last year after eating contaminated romaine lettuce from Walmart, the company decided to push forward with its two-year blockchain pilot project to track spinach bags and lettuce heads. The company claims the new system allows it to selectively discard bad product batches, reducing waste and losses from throwing away products in marketable conditions.

The project involves food producers feeding a blockchain-based ledger with detailed information about their products and fits well within Walmart’s strategy of promoting its digital prowess and highlighting its fresh food quality to customers. However, there is one caveat: blockchain is not actually needed to achieve these goals, nor does it guarantee that the data fed into the system is true and accurate.

Talks with industry specialists suggest that non-blockchain IT systems can handle these data flows and, in Walmart’s case, the ledger is stored at a single node in the cloud, ultimately defeating the very purpose of blockchains as distributed computer systems.

In our view, this is another example of resources being squandered for the sole purpose of enhancing public relations. A more rational strategy would likely involve carefully selecting adequate systems to handle homogenous products with batches from different vendors, properly label and track the stores selling them.

**Carrefour: Blockchain sales boost**

In what has been advertised as Europe’s first food blockchain, Carrefour last year launched a blockchain initiative to allow customers to track food products’ entire journey across the supply chain, from farm to shelf, with data as specific as date of harvest, packaging date, time in transport, etc.

In a recent media report, Carrefour’s management has attributed increased sales to the blockchain project, going as far as saying that they had “a positive impact on the chicken versus the non-blockchain chicken”.

Your attention is drawn to the section entitled “Important information” at the end of the note. © Elwood Asset Management LLP. All rights reserved
Carrefour does not need to use blockchain to provide customers with product traceability. The UN’s Food and Agriculture Organisation (FAO) has well-defined standards for food batch identification, including items Carrefour claims its blockchain system make possible to trace such as harvest date or packaging details. In our view, by claiming higher sales, Carrefour goes one step further than Walmart in using blockchain as a public relations tool while, in reality, the company is just providing a new interface for customers to access food label data.

**What companies in our index are doing**

In this section we go into more detail on our index companies’ activities in the blockchain payment systems space, with projects ranging from outright accepting or selling cryptocurrencies (usually Bitcoin) to attempting to develop ecosystems in which customers could use new or existing cryptocurrencies to exchange goods, services or cash. Motivations are varied and range from plans to leverage upon existing users or to building infrastructure that could lead to successful blockchain adoption. In this section, we will present four companies, which we believe could apply blockchain technology with

**Facebook: further monetising its vast user base**

In June 2019, Facebook announced a project to launch its own cryptocurrency, Libra, with the aim to universalise banking services to large portions of the global population using Facebook’s large user base and extensive geographic reach. In reality, however, we see Libra as a way of Facebook catching up with Chinese giants Alibaba and Tencent, who have large presences in the payments area, and addressing Facebook’s faltering growth and low revenue per user in some geographies.

Facebook has nearly 2.5 billion monthly active users, but user growth of 8% in the quarter to September 2019 is less than half the 17% peak in June 2017. In addition, out of the c.2.5 billion users, 74% are based in Asia-Pacific and Rest of World, but are responsible for only 28.5% of revenues.

The discrepancy stems from the difference in average revenue per user (ARPU) between developed markets (Europe, North America) and Asia-Pacific and Rest of the World, with the latter ARPU being less than a tenth of North America’s.

Coincidence or not, the vast majority of the global unbanked population is based in the regions where Facebook’s ARPU is the lowest. By targeting this market, Facebook is directly making it more likely that its least profitable users increase their spend within the company’s ecosystem, leading to higher engagement and monetisation possibilities.
Partner dropouts and backlash from governments

In the months after the announcement, the project gained significant media attention and was received with scepticism by governments and the cryptocurrency community, albeit for different reasons: the former is reluctant in relinquishing monetary policy power to private enterprises, whilst the latter claims that Libra’s structure, which consists in a permissioned blockchain environment and relies on a small number of validator nodes, defeats the only purpose of blockchain, which is striving for the decentralisation of control of the ledger.

As a result, Libra has received considerable backlash. Initially, Facebook had managed to bring together 28 companies to form the Libra Association, an international organisation being set up in Geneva, Switzerland. However, in early October 2019, in the two weeks leading to the signing of the Libra charter, seven companies dropped out (PayPal, eBay, Mastercard, Strip, Visa, Mercado Pago and Booking Holdings), with the remaining 21 companies endorsing the document, leaving Libra with no members from the payments industry.
Additionally, governments have been particularly unwelcoming to the idea of Facebook at the helm of a global digital currency. In a joint statement on 12 September 2019, Germany and France affirmed that “no private entity can claim monetary power, which is inherent to the sovereignty of nations”. In the same week, Facebook’s CEO Mark Zuckerberg assured members of the US Senate that Libra would not be launched until regulatory concerns had received “appropriate approvals”. Nonetheless, Zuckerberg was summoned once again to testify before the US House Financial Services Committee, where it became apparent that members of the US Congress did not fully trust Facebook and the intentions behind Libra.

**Facebook Pay - a potential plan B to Libra?**

The Libra backlash and increased scrutiny will certainly delay Facebook’s plans of launching the digital currency in the first half of 2020. Nonetheless, the company seems to be determined to start providing financial services and, in November 2019, it announced Facebook Pay, a payment service to facilitate transactions within its app ecosystem. While Facebook clearly states that Facebook Pay is separate from the Calibra wallet, we see this move as a hedge against the possibility of Libra not being approved by regulators.

Facebook Pay will be initially available in the US, with roll-out commencing at the Facebook and Facebook Messenger apps, with future Instagram and WhatsApp integration. However, rather than offering a new solution, Facebook Pay is in reality a credit card and bank account data storage system, working with existing financial services infrastructure, aiming solely to facilitate existing payment transactions. We believe the removal of spending barriers is a further effort to increase revenue per user and somehow leverage upon the company’s large user base. Below we lay out the main differences between Facebook Pay and Libra:

**Facebook Pay and Libra comparison**

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<th>Facebook Pay</th>
<th>Libra</th>
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<td>Underlying infrastructure</td>
<td>Existing financial services</td>
<td>New blockchain infrastructure</td>
</tr>
<tr>
<td>Source of funds</td>
<td>Bank accounts, credit and debit cards</td>
<td>Calibra and third-party wallets</td>
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<td>Supported applications</td>
<td>Facebook, Messenger, Instagram, WhatsApp</td>
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<tr>
<td>Currency</td>
<td>Local fiat currency</td>
<td>Digital currency (Libra), backed by fiat</td>
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</table>

(Source: Facebook, Elwood research)

**Square: promoting cryptocurrencies from management down**

Square Inc. is led by Twitter CEO and vocal Bitcoin enthusiast Jack Dorsey. Square provides payment infrastructure to small and medium-sized businesses as well as financial services to individuals through its Cash App.

Square has had a relatively long history and involvement with Bitcoin. In 2014 Square Marketplace, the company’s online storefront, started accepting Bitcoin in all purchases. However, the initiative was quietly discontinued as customers did not associate purchasing everyday items using Bitcoin.

In November 2017, Square revisited Bitcoin and started allowing select users to buy and sell bitcoin through the Cash App. The new feature was rolled out gradually and became available in all US states by August 2018, although only in June 2019 the company made a formal announcement that all users could deposit bitcoin into their Cash App accounts.
Revenue from Bitcoin has grown from $34m in Q1 2018 to $148m in Q3 2019 (December year-end), averaging c.28% quarter-on-quarter growth. Additionally, Bitcoin sales accounted for c.12% of Square’s revenues in the quarter to September 2019, up from 5% in Q1 2018.

By comparing Square’s Bitcoin revenue numbers against average quarterly Bitcoin prices, it is possible to estimate the number of bitcoins sold through the Cash App. Our estimates suggest that Square traded c.3,300 bitcoins in Q1 2018 offering Bitcoin transactions at the Cash App, peaking at c.17,500 in the first quarter of 2019 and down to c.14,300 in the Q3 2019. The relationship between the number of bitcoins traded and average price does not seem to be as black in white as one would suggest and we would assume that media reports and publicity around cryptocurrencies could be a more meaningful driver to Square’s revenues in this area.
At 1.43%, gross margins from the Bitcoin business are very low in relation to the group average of 39% in Q3 2019. This is because the revenue reported by Square relates to gross Bitcoin transaction amounts, with the gross margin broadly representing the spreads charged by the company. From November 2019, it had been reported that Square’s Cash App had started to charge a transaction fee between 1% and 1.76%, depending on the traded amount. This has been confirmed by the company, which stated that the new fee structure has been designed to provide increased transparency to customers.

As the charts above suggest, Square is some way away from generating significant revenues and profits from Bitcoin. However, in our view, Square has a significant opportunity with Bitcoin - by December 2018, the Cash App had 15 million monthly active users, more than double the number of December 2017. Using an average of 11 million monthly users, Square had an average bitcoin of just $15 per user in 2018. Using download data, we have estimated the Cash App to have reached c.21m users by the end of June 2019, averaging c.18m users in H1 2019. By matching these
figures against reported H1 2019 Bitcoin revenues, we can derive a Bitcoin revenue of $21 per user, representing an increment of c.40% in relation to 2018 numbers. As a comparison, in 2018 cryptocurrency exchange Coinbase had an average of 19 million users, from whom it generated c.$530m in revenues, or $26.75 per user, almost double Cash App’s Bitcoin revenues per user.

**Square Crypto team: building a deep understanding of the underlying blockchain technology**

In March 2019, Square CEO Jack Dorsey unveiled Square Crypto, a division dedicated entirely to open source solutions to the Bitcoin and cryptocurrency environment. Former Google director Steve Lee was the division’s first hire, announced in June 2019, with Blockstream co-founder Matt Corallo following in August 2019. In September 2019, Square Crypto announced its inaugural team was complete, with three additional joiners: Valentine Wallace, from Lightning Labs, Jeffrey Czyz, from Google and Arik Sosman, from Libra. With diverse backgrounds and experience ranging from building applications such as Google Maps to extensive Bitcoin and Lightning development, the team has a strong understanding of the underlying technology.

**Line: benefitting from a head start among key blockchain users**

Line is a Japan listed company, 72% owned by Korean company Naver. The company owns the web-messaging app of the same name, which is the most popular mobile messenger platform in Japan, Thailand and Taiwan, with also a significant presence in Indonesia. In the quarter to September 2019, Line had c.164 million monthly active users (MAUs), half of them based in Japan.

In addition to allowing users to freely message each other, the Line app provides social network functions, such as timeline, group chats, news feed and other community support services in order to increase engagement and monetisation opportunities for the business.
very strong consumer reach in Japan, but it is far from certain that their blockchain endeavours will succeed.

In August 2018, Line launched its own digital token to serve its blockchain system. Launched in August 2018, LINK will serve as a reward to decentralised application (dApp) users, who will be able to use the token to receive or pay for benefits in the form of content and services offered through dApps. LINK was listed at BITBOX in October 2018 and can be exchanged for other cryptocurrencies traded in the exchange.

In our view, Line’s initiatives in the Fintech sector show a clear ambition towards expanding the influence of its well-established ecosystem (especially in Japan) and increasing the monetisation of its user base through its own financial services. Whilst we believe that Line currently has the right elements in place - a high number of users in Japan (nearly ⅔ of the population), an established social network, a payments interface and a quickly developing blockchain ecosystem - technical and regulatory hurdles are likely to appear, leading to potential delays. Line may have very strong consumer reach in Japan, but it is far from certain that their blockchain endeavours will succeed.

Increased focus on Fintech

Line also offers other services, especially related to Fintech activities. One of these services is Line Pay, through which Line aims to increase the number of payment options available to Line users. Line Pay allows users to make payments onto the Line Store, partner retailers, transfer funds to other LINE users and, depending on the location, withdraw cash from select banks. In 2019, Line partnered with VISA to offer Visa-branded credit cards, which can be used independently or linked to a LINE Pay account.

Line has also been fairly active in cryptocurrencies - in July 2018 the company launched cryptocurrency exchange BITBOX, which became available to all users outside the US and Japan. However, with Japan being Line’s most significant market, the lack of a presence in cryptocurrencies remained an issue. This was solved in September 2019 when Line launched Bitmax to provide cryptocurrency trading services to its users in the country, allowing it to finally leverage upon its 81 million strong user base in Japan.

Line’s LINK token could be used for payments, but also as a backbone for dApps

A further initiative is being rolled out in the form of LINK, Line’s own digital token to serve its blockchain system. Launched in August 2018, LINK will serve as a reward to decentralised application (dApp) users, who will be able to use the token to receive or pay for benefits in the form of content and services offered through dApps. LINK was listed at BITBOX in October 2018 and can be exchanged for other cryptocurrencies traded in the exchange.

Revenues are generated mainly through ads, displayed in user timelines, via featured feeds (business accounts) or corporate sponsored stickers. Other revenue streams come from user created sticker sales, from which Line collects a fee, and other content such as in-game purchases.
Rakuten: Japanese retail leader gearing up for increased cryptocurrency adoption

Rakuten Inc provides Internet Services including "Rakuten Ichiba", its core marketplace e-commerce site in Japan. The company also provides Internet Finance services, which include "Rakuten Card", "Rakuten Bank" and a securities trading platform. Rakuten is one of the leading e-commerce platforms in Japan, but has recently been losing share to Amazon and as well as other niche players.

Over the last five years Rakuten has been considerably active in blockchain

Rakuten started accepting Bitcoin as a means of payment in March 2015 at its US online store (Rakuten.com) by integrating its American website with Bitnet. Also in March 2015, the company announced it would be extending the Bitcoin payment roll-out to Germany and Austria following the US.

In the next year, 2016, a few actions unfolded in the blockchain area. The company launched a blockchain lab in Belfast, Northern Ireland, with the goal of exploring applications for blockchain in e-commerce and fintech. In the same year, the company acquired Bitnet (founded by former VISA executives), which provided control over the US online store ecosystem. In 2016 Rakuten also exited the Austrian market, one of the geographies the company had expected to roll out Bitcoin payments.

In August 2018, Rakuten announced the acquisition of Everybody’s Bitcoin Inc, a Bitcoin exchange and, one year later, in August 2019, the company launched its own exchange for trading cryptocurrencies, the Rakuten Wallet.

Blockchain remains important and cryptocurrency payments could be possibly introduced in Japan

Rakuten’s main market where c.80% of revenues are generated is the Ichiba ecommerce platform in Japan. This platform is responsible for an even higher proportion of group earnings. The company still does not offer Bitcoin as a payment option on Ichiba, but there are some indications that Rakuten could be preparing to soon introduce it in the Japanese market:
1. **Introduction of QR code payment to Rakuten Pay**: allowing shop owners to offer digital payments without the need of a dedicated terminal, but using a unique QR code, transforming the customer’s mobile phone into a mobile payment unit. QR interfaces are also used for cryptocurrency payments and we would not be surprised if Rakuten launches a Bitcoin payment solution based on this technology.

2. **Rakuten’s business reorganisation**: earlier in 2019, Rakuten reorganised its business into three subsegments: mobile, FinTech and payments businesses. More interestingly, the “everybody’s Bitcoin” business has fallen under the “Rakuten Payment Inc.” umbrella, suggesting that payments is one of Rakuten’s focus areas, and with everybody’s Bitcoin being rearranged into this subsidiary, blockchain could be one of the target technologies within payments.

Rakuten’s 2019 business reorganisation

In North America, however, Rakuten continues to promote cryptocurrency payments adoption and, in July 2019, it announced that Rakuten Super Logistics, the company’s b2b order fulfilment services arm, would start accepting Bitcoin payments from its customers. Management has declared that the accepting Bitcoin differentiates Rakuten from the competition, but also moves the company closer to a true global frictionless market.

A key sales driver for Rakuten in Japan, is the super points systems, which customers earn from using Rakuten's credit card and Ichiba platform. This is one of the largest loyalty points systems in Japan and there has often been speculation that blockchain technology could be used to improve the consumer proposition. If blockchain technology were used in this area, Rakuten has the client base and scale to roll this out. There could be further synergies with the group’s other financial products, such as the security trading platform and credit card business.

**Viber and Rakuten Coin**

In July 2018, Viber’s CEO Djamel Agaoua announced that the company, which is wholly owned by Rakuten, was planning to launch its own digital coin, the Rakuten Coin, in Russia within 6 to 12 months. The coin would be stored in a Viber wallet and distributed across Viber’s messaging app network. Viber has over 45 million registered users in Russia and is the country’s second most used messaging app, with 57% of mobile phone owners reporting to have it installed and 38% declaring to have used it.
However, as of writing, Rakuten Coin was yet to be launched in Russia with media reports suggesting that the launch date had been changed to Q4 2019. There are legal uncertainties surrounding a potential coin launch in Russia, as the country’s legislation is unspecific about what requirements cryptocurrencies need to fulfil.

Telegram, another messaging company, suffered from similar regulatory drawbacks whilst planning to launch its own blockchain. In the US, the SEC deemed Telegram’s token, the “gram” as a security, accusing Telegram of attempting to bypass securities laws by launching the gram as a currency. The launch has been blocked in the US and has been delayed for at least six months. We do not rule out similar issues affecting Rakuten Coin, which could lead to postponements or, worst case, the shelving of the project.

More recently, Viber’s CEO declared that the company plans to roll out its cryptocurrency strategy on a global scale. In our view, Viber could be key in Rakuten’s global plans as the app is widely available, has 1 billion users and is the most popular messaging app in 10 countries, with a significant presence in other regions as well.
Payments could increase Viber’s earnings potential

Rakuten does not separately report Viber’s revenues, but acquisition documents show $1.5m of revenues in the year to December 2013. In addition, the company reports the number of unique IDs all the way back to the quarter ended in December 2014 and quarterly revenue growth from June 2017. In order to estimate current revenue, we assume Viber grew at 100% in FY14, then 80% per quarter until Q1 2017, broadly in line with subsequently reported growth rates.

Estimated Viber revenues

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<tbody>
<tr>
<td>Year-end unique IDs (millions)</td>
<td>280</td>
<td>516</td>
<td>711</td>
<td>858</td>
<td>980</td>
<td>1,074</td>
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<tr>
<td>Period average unique IDs (millions)</td>
<td>215*</td>
<td>398</td>
<td>614</td>
<td>785</td>
<td>919</td>
<td>1,027</td>
</tr>
<tr>
<td>Est. ARPU (¥/user)</td>
<td>0.67</td>
<td>0.72</td>
<td>0.87</td>
<td>1.23</td>
<td>2.12</td>
<td>3.06</td>
</tr>
<tr>
<td>Growth</td>
<td>n.a.</td>
<td>9%</td>
<td>21%</td>
<td>42%</td>
<td>72%</td>
<td>44%</td>
</tr>
<tr>
<td>Est. revenue (¥m)</td>
<td>143</td>
<td>287</td>
<td>534</td>
<td>967</td>
<td>1,946</td>
<td>3,138</td>
</tr>
<tr>
<td>Growth</td>
<td>n.a.</td>
<td>101%</td>
<td>86%</td>
<td>81%</td>
<td>101%</td>
<td>61%</td>
</tr>
</tbody>
</table>

(Source: Rakuten, Elwood research)

The data suggests that, even when applying some aggressive growth assumptions in early years, our Viber revenue estimates represent a very small share of group revenues (0.3% of group revenues of JPY1.1bn in FY18), and, if our estimates are broadly right, the messenger’s cumulative revenues are nowhere near the $900m that Rakuten paid for the messaging platform six years ago.

We believe that, by launching Rakuten Coin, the company is aiming to increase Viber’s revenue potential, through which it could make it possible for “supergroup” (large, limitless size groups) administrators to monetise messaging streams, while also allowing Rakuten Coin to be spent on associated stores and media channels, further increasing the sales potential. Finally, Rakuten Coins will be redeemable for Euros, US Dollars and, potentially Rubles as well.
Conclusion

In this report we analysed the strengths and weaknesses of both traditional and blockchain payment systems. We conclude that, while some advocates seem to tout blockchain as a panacea, the actual impact is restricted to situations where blockchain technologies have the real potential to lower governance and security related costs.

As a decentralised computer system, a blockchain is by construction more complex than a centralised computer system such as a database. Naively replacing in-house databases with blockchains would only increase IT costs due to higher computational requirements and lower performance in terms of throughput and latency.

Within the payment services sector, a typical transaction has to pass through a chain of centralised computer systems, each maintained by a different intermediary. While each intermediate system can be fast per se, there can be significant delay between upstream and downstream entities, resulting in extremely low efficiency and exorbitant processing fees. This poor coordination between entities, alongside rent-seeking incentives, explain the lack of competition and innovation in this business area.

Blockchain payment systems shine when trust minimisation and disintermediation leads to services of higher quality at lower costs. A blockchain may be slower than a single centralised system but can outperform a network of centralised systems with expensive interfacing communication. In certain cases, blockchain payment systems can offer services at price levels that are impractical for the traditional database architecture to match. The ability to identify the right problem domains to apply blockchain technologies is pivotal for corporates intending to capture the benefits.

In this report we have gone through some initiatives which we believe have the potential to bear fruit in the future, such as a project of Square by a highly qualified blockchain team and plans by Line and Rakuten to benefit from business scale in the Japanese market. In addition, considering the global customer base of Facebook, we have provided an analysis on its motivations behind Libra and the disruptive potential. However, for all these companies, there is a high degree of uncertainty surrounding the success of their blockchain products. The uncertainty may be reduced once blockchain is better understood by company management, government authorities and the customers, a process that could take several years.
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