

## Blockchain in Financial Services in Emerging Markets Part I: Current Trends

*Financial institutions around the world find themselves continually barraged by external innovations they are often unable to absorb and internalize. The emergence of innovative digital financial technologies has challenged traditional players in the sector by demonstrating new ways to deliver value across the entire financial value chain. Blockchain, or distributed ledger technology, is just such a disruptive—and possibly game-changing—innovation.*

*Emerging markets are in general characterized by low banking penetration, the exit of financial players from certain markets, strong demand for financial inclusion both from individual consumers and small businesses, high levels of mobile penetration, and less developed business infrastructure and financial sector incumbents. These conditions in combination can be a powerful catalyst for the adoption of blockchain-based financial solutions and can provide the basis for a technological leap forward and a boost to financial inclusion and growth.*

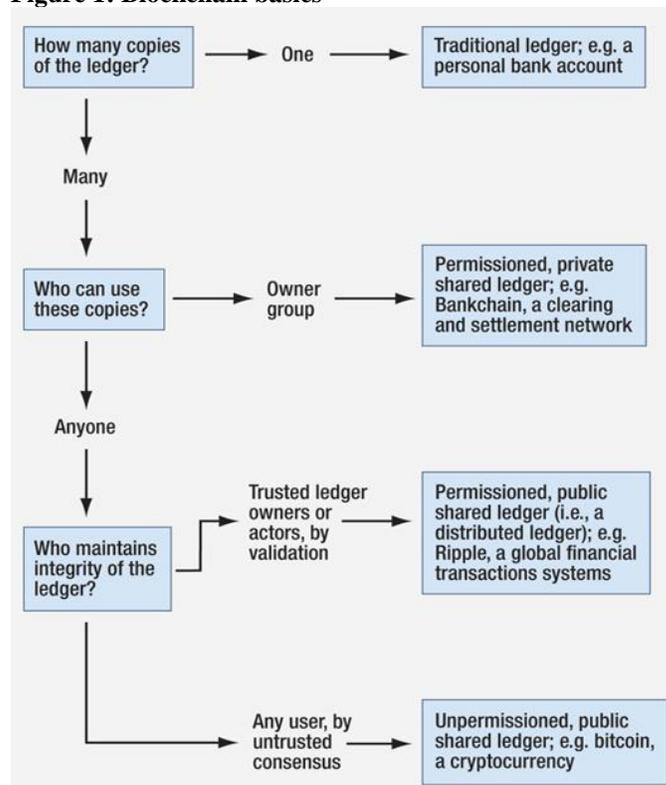
Blockchain, or distributed ledger technology, is a digital, distributed, immutable transaction ledger that replaces a central authority (or ‘middleman’) with algorithms. By doing so it offers numerous opportunities for cost savings while opening new market segments for existing financial institutions and new players alike.<sup>1</sup>

Distributed ledger technology is still in an early stage of development and deployment, yet it is widely thought to have the potential to deliver a new wave of innovation to the financial technology, or fintech, ecosystem by providing a ‘trustless’ distributed system to exchange value.

This does not mean that the new system is not trustworthy. Instead, blockchain’s unique technology eliminates the need for ‘trusted’ intermediary to guarantee the authenticity of and register a transaction, and thus could have the same transformative impact for the transfer of value that the Internet had for the transfer of information. As described by the World Economic Forum, it is the future “beating heart” of the financial sector.<sup>2</sup> (See Figure 1 for Blockchain basic functionalities).

Bitcoin, a cryptocurrency that emerged in 2009, provided the first widespread use of blockchain. Since then, the technology has been synonymous with digital currencies. Yet the early abuse of bitcoin by criminal enterprises may have hindered the development of blockchain. Many other digital currencies have since emerged, including ether, the crypto-currency token used on the Ethereum distributed applications platform, the closest challenger to Bitcoin.

**Figure 1: Blockchain basics**



Source: Consult Hyperion

Today a number of experiments are taking place in the financial industry that attempt to broaden the use of blockchain beyond its use as a digital fiat. These range from relatively straightforward solutions such as money transfers, to more complex financial instruments enabled by the introduction of ethereum and smart contracts, such as trade clearance and settlement.

Based on research conducted by Catalini and Gans (2016), EMCompass Notes 40 and 41<sup>3</sup> detailed a conceptual framework that assesses the evolution of blockchain adoption across markets based on (i) the market power of incumbents; and, (ii) the complexity and associated costs of the solutions proposed. It predicts that future developments will be propelled by the drive to create new markets, where competition and barriers to entry are lower, or to target process efficiencies in existing operations, where current players maintain considerable market power. Additionally, value-added applications built on top of existing blockchain functionalities would be the early use cases of blockchain by financial institutions, according to the research.<sup>4</sup>

The framework also makes supports the idea that blockchain technology could have a strong impact in markets currently neglected or underserved by financial institutions, with a less competitive market structure and high verification costs. These conditions are typical in emerging markets.

Current developments show that use cases that are relatively simple to design and implement are appearing. For instance, digital wallet AliPay is adding a bitcoin option for its customers. Visa has partnered with blockchain company Chain to build Visa B2B Connect, an enterprise blockchain infrastructure to facilitate international financial transactions for their corporate clients.

Established financial institutions are more likely to use blockchain for intra-organizational projects intended to reduce organizational complexity, improve efficiency, and reduce costs. Banks and major financial institutions are working both collaboratively and independently to develop blockchain technology, as seen in the proliferation of global consortia (see below).

Emerging markets, despite getting a later start on blockchain than the United States and Western Europe, have been catching up, with strong performances in 2016-17, in particular by Asia (see EMCompass Note 44). And governments and regulators are taking notice, and trying to fashion appropriate responses.

In India, the legalization of bitcoin is a hotly-contested policy issue between the Ministry of Finance, which would like to tax it, and the Reserve Bank of India, which has declared bitcoin illegal and in breach of anti-money laundering provisions.<sup>5</sup> The

Indian situation is an example of how distributed ledger technology has the power to act as a disrupter, but also as an enabler to market players, changing business models and influencing the governance of the global financial system.

Recent venture capital developments also indicate that the financial industry is mobilizing around the potential impact of blockchain on their business, and is beginning to invest in related research and development and is testing applications.<sup>6</sup> Investment in blockchain is gaining momentum, with approximately \$1 billion of venture capital investment over the last 24 months (\$500 million in 50 venture capital deals in 2016 alone) and the trend is expected to grow rapidly.

A 2017 McKinsey survey found that the global banking industry is expected to spend \$400 million on blockchain related projects by 2019. Some 70 percent of financial organizations are in the early stages of experimentation with the technology and most executives expect to see material impact in mainstreaming it in the next five years. A first rough estimate of limited applications, driven mostly from a cost reduction perspective, suggests significant value creation on the order of \$70 to \$85 billion.<sup>7</sup>

This note seeks to: examine current macrotrends of the blockchain ecosystem in the financial services industry and areas where the technology is being actively tested; analyze the implications of the technology on business models; and identify use cases with the most dynamic uptake, from the perspectives of both efficiency in existing processes, and of market creation.

EMCompass Note 44 will provide a brief overview of specific regional developments in emerging markets with regard to blockchain.

### **Potential Impact of blockchain on the financial services sector-Current developments and trends**

**The drive for efficiency in existing businesses.** Most of the attention surrounding blockchain has centered on the United States and Western European countries, particularly on the financial services industry, where the technology is expected to have a major impact due to its ability to reduce transaction costs.

As a result, blockchain innovation has been closely linked to the efforts of large financial institutions that focus on process efficiency initiatives. These firms have started testing distributed ledger technology solutions to address specific problems or improvements in their business processes, including data reconciliation, clearance, settlement, regulatory compliance, and entry into new segments or markets.<sup>8</sup>

Consistent with the conceptual framework mentioned above, major global banks and financial intermediaries are working closely with blockchain companies to explore use cases that are

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relevant to their business and learn how the new technology may impact their legacy systems and infrastructure. They are also entering into consortia (some more than one) to mutualize development and potential transition costs, as well as race to establish standards for the emerging technology.

Most corporate initiatives so far have taken the form of enterprise or permissioned (private) blockchains, as companies attempt to manage a trade-off between leveraging the new but still unproven innovation and preserving the integrity of their existing business concerns. Post-Trade Distributed Ledger Group brings together global banks, custodians, central securities depositories, clearing houses, exchanges, regulators, government agencies, and central banks from all continents to share information and ideas about how distributed ledger technologies can transform the post-trade landscape.

The newly launched (February 2017) Enterprise Ethereum Alliance (EEA) aims to leverage large corporate investments in the private Ethereum blockchain, bringing together Fortune 500 companies, startups, and other stakeholders.

Interest in comparing alternatives to blockchain is also great, evidenced by broad industry participation to the R3 consortium, an alternative distributed consensus ledger.<sup>9</sup> This group has grown to include more than 70 global banks, despite the highly

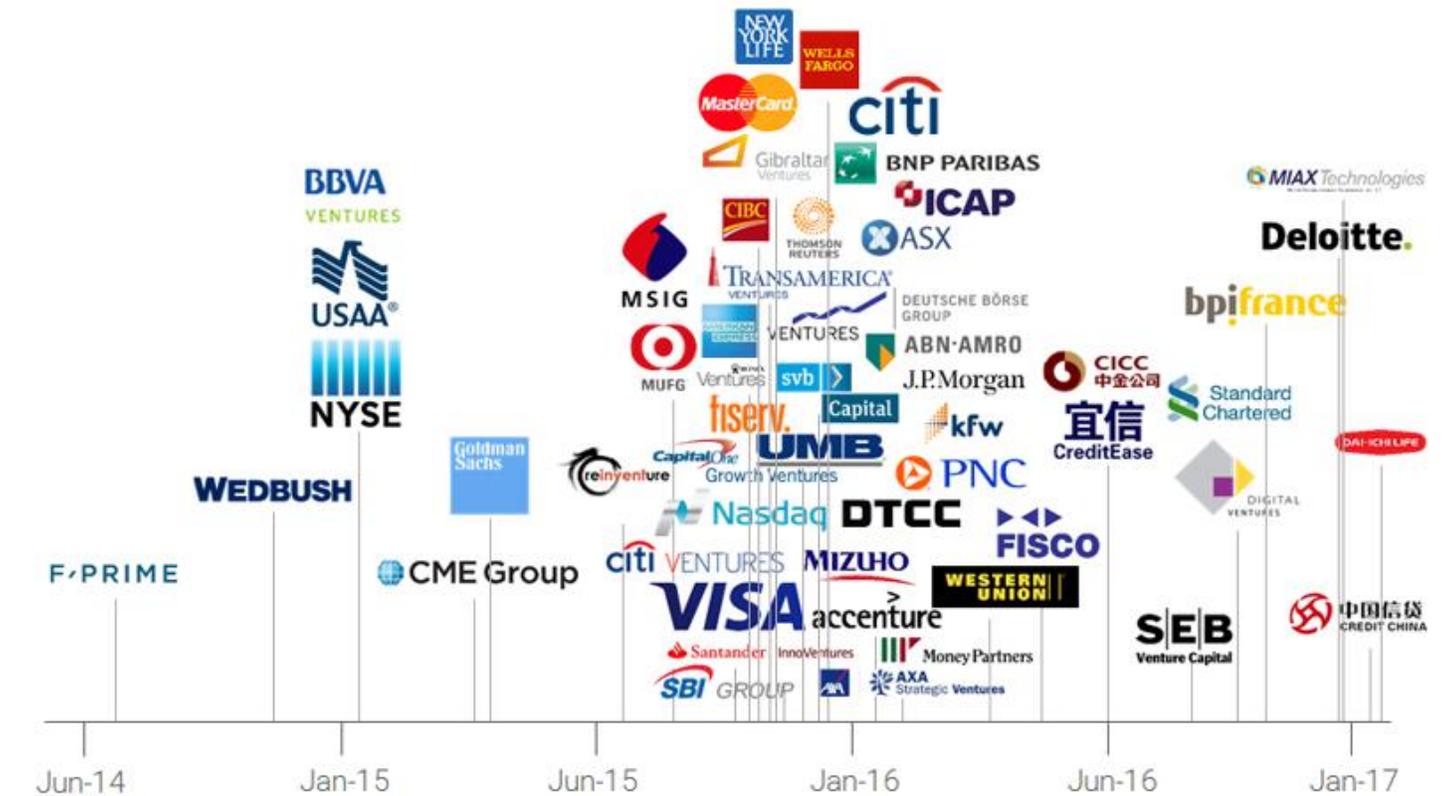
publicized departures by Goldman Sachs and Santander in 2016, which reportedly were due to governance conflicts. Corda, its underlying protocol, is technically more of a messaging protocol. Ripple, which offers a blockchain-like technology and network for faster settlement of international payments, has more than 75 banking clients globally.

In addition, financial services firms have also entered the blockchain space as investors, with corporate venture capitalists becoming the most active investors in bitcoin and blockchain technology in 2016-17.

**Create new markets.** On the other end of the spectrum, blockchain is a disruptive technology that offers the possibility of reengineering economic models and enabling the development of markets and products that were previously unavailable or unprofitable.

A great number of these new market opportunities that distributed ledger technology makes possible are related to: (i) its offer of an alternative to fiat money, addressing in a new manner challenges of currency instability and political risk and, (ii) its ability to establish a digital identity in a rapid and cost-effective manner and thereby allow the financial inclusion of previously underserved consumer segments.

**Figure 2: The march of financial services firms into bitcoin & blockchain start-ups, 2014 to February 2017**



Source: CBInsights, cbinsights.com

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This development also creates opportunities for new startups and entrepreneurs or established players from non-financial industries with a strong customer base, such as telecommunications or ecommerce companies. Such actors are rapidly moving to introduce new business models and services, and are transforming in the process the value chain and challenging traditional players such as banks. Consistent with the framework mentioned in EM Compass notes 40 and 41, the majority of these initiatives focus on value-added yet fairly simple design applications.

These efforts have originated mainly with new companies entering established markets, targeting emerging markets directly or indirectly. They are not exclusively based in developed markets, although the best funded ones are, for now, U.S.-based. A huge portion of the total venture capital investment has been captured by a handful of startups in the digital wallet and capital market services space (\$625 million).<sup>10</sup> Regardless of their origin, these new players are targeting segments closely related to the economic activity of developing markets, such as remittances and trade finance.

This is a significant phenomenon, indicating that emerging markets can become a dynamic testing ground for new business models, where a high demand for financial inclusion and a relative absence of entrenched legacy systems can accelerate the adoption of new technologies—and specifically of blockchain. The potential for extending banking services in these markets is huge, with two billion adults worldwide lacking access to financial and credit services.<sup>11</sup> Global payments and remittances is a case in point: it is a \$4 trillion market with transaction fees that range from 5 to 30 percent.

**Blockchain potential use cases and applications in financial services industries.** Blockchain's potential to disrupt the financial services ecosystem has been widely discussed, including its capacities for operational simplification, regulatory efficiency improvement (real-time monitoring of financial activity between regulators and regulated entities), counterparty risk reduction (agreements are executed in a shared, immutable environment), disintermediation for clearing and settlement of transactions, and transparency and fraud minimization in asset provenance and capital raising. Given the wide range of potential use cases, we have chosen to focus on three dynamic and well documented subsectors, where use cases are being tested and have concluded or are in the process of concluding a proof of market, including in the context of emerging markets.

**Anti-money laundering and customer identification programs.** The reinforced regulatory framework that followed the financial crisis has significantly increased the costs of compliance for banks (anti-money-laundering compliance costs have risen 53 percent since 2011<sup>12</sup>). This has forced banks to exit certain markets and segments and has left emerging

markets in a derisking downward cycle. In 2015, European banks reduced their cross-border lending to emerging markets by \$700 billion, according to the Bank of International Settlements.<sup>13</sup> In addition to the financial costs, Know Your Customer requests can delay transaction, stretching them to 30 to 50 days to complete.

A blockchain-based automated compliance system can provide an innovative and cost-effective alternative to managing regulatory requirements by acting as a decentralized public key infrastructure to establish and secure digital identity. The blockchain can be viewed as a decentralized certification authority that can maintain the mapping of identities to public keys. Smart contracts can add sophisticated logic that helps with key revocation and recovery, decreasing the key management burden for the end user. The potential positive impact of this innovation in reliable digital identification has broad implications for a host of financial services, including trade finance and cross border payments and digital wallets (see below), and also for the future evolution and mainstreaming of blockchain technology beyond fintech, into industrial applications and Internet of Things integration.

Using distributed ledger technology to store financial information can eliminate errors associated with manual auditing, improve efficiency, reduce reporting costs, and potentially support deeper regulatory oversight in the future.

Currently there is no standardization in the identifying information customers must submit to financial institution, and these institutions often duplicate efforts in performing Know Your Customer checks, with burdensome transaction costs on both banks and customers. With a distributed ledger technology, a rigorous professional validation is done once and this verified identity document can be used for all subsequent transactions. On a blockchain, that identity can develop over time as a person accrues attestations, property, and other types of licenses and authoritative powers. As the U.S. Financial Crimes Enforcement Network regulations and European Anti Money Laundering directives move toward stricter customer due diligence and data collection, blockchain-based Know Your Customer systems are likely to help government and financial institutions simplify Know Your Customer syndication.

A blockchain identity system will allow end users to own and control their personal identity, reputation, data, and digital assets; securely and selectively disclose their data to counterparties; log in to and access digital services without using passwords; digitally sign claims, transactions, and documents; control and send value on a blockchain; and interact with decentralized applications and smart contracts.

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Companies can establish a corporate identity, easily onboard new customers and employees, reduce liability by not holding sensitive customer information, and increase compliance.

**Sample use cases.** Several startups from around the globe are taking the concept to market. U.S.-based UPort has developed an Ethereum-based digital identity management product to deliver a ‘self-sovereign identity’, targeting both end-consumers and enterprises. Cambridge Blockchain LLC is developing digital identity software with several leading global financial institutions, with a deployment planned for late 2017. Gem focuses on getting companies within the same industry to share information on Know Your Customer via blockchain technology, where banks would be able to vet a customer by relying on the work another bank has already done.

London-based CreditsVision is looking to create a blockchain of blockchains, connecting various permissioned and public systems so that a digital identity could be truly universal. Singaporean investment portal KYCK! has partnered with IBM to develop a secure blockchain network to enhance identification validation, shared between banks and government organizations. Indian startup Elemential provided the blockchain technology for a Know Your Customer data trial in a collaboration with the National Stock Exchange of India and several banks—ICICI Bank, IDFC Bank, Kotak Mahindra Bank, IndusInd Bank and RBL Bank—as well as HDFC Securities, a Mumbai-based brokerage.

This represents an opportunity for incumbent financial institutions to adapt their traditional banking models and to gain a competitive advantage vis-a-vis new entrants, by positioning themselves as ‘the stewards of identity’, in effect serving as authenticators.<sup>14</sup>

### Trade finance

Trade finance is the lifeline of global trade. The International Chamber of Commerce estimates that the global trade financing gap is around \$1.6 trillion, with particularly dire consequences for small and medium-sized businesses and for growth in emerging markets.<sup>15</sup> In this segment, financial institutions bridge the gap between exporters, who need guarantee of payment before they can ship, and importers, who require data on whether goods have been delivered. Roughly \$18 trillion of annual trade involves some form of finance, be it credit, insurance or guarantee.<sup>16</sup> The size of the trade finance market itself exceeds \$10 trillion per year.<sup>17</sup> However, its supply chain system is cumbersome and time-consuming, creating potential risks for the parties involved, where Anti-Money Laundering and authenticity issues weigh heavily.

Exporters use invoices to secure short-term financing from multiple banks, which increases the consequences should the delivery fail. Parties use different platforms, raising the odds of miscommunication, fraud, and problems with version

compatibility. Multiple checkpoints delay payment and slow the shipment of goods. Additionally, trade finance is particularly affected by increased compliance requirements and de-risking, as outlined in the previous section.<sup>18</sup> Respondents to 2016 IIC Global Survey on Trade Finance identified anti-money laundering and Know Your Customer requirements as the largest impediment to trade finance.<sup>19</sup> The consequences for global trade and emerging market growth are enormous.<sup>20</sup>

Blockchain can positively transform a number of industries by introducing transparency, traceability, and immutability to their supply chains. Using distributed ledger technology to store financial details can prevent documentary fraud, facilitate the real-time approval of financial documents, unlock capital tied up in the process of waiting for clearance, reduce counterparty risk, and enable faster settlement.

With blockchain, multiple copies of the same document no longer need to be stored on numerous databases across various participating transaction entities, and the approval process does not need to be sequential. Since each participant on the network quickly updates the chain to reflect the latest transaction, it removes the need for multiple copies of the same document of information stored on numerous databases.

A single blockchain has all the necessary information in a single digital document, simultaneously accessible to all members of the network. Documents on the distributed ledger allow all parties to conduct diligence for credit adjudication, check for anti-money laundering and trace the location and ownership of goods. Banks no longer need intermediaries to assume risk, and compliance officials can enforce anti-money laundering and customs activities without delay.

Additionally, using smart contracts (self-executing digital contracts) to codify agreements could lead to new products for alternative financing, securitization of trade obligations, and downstream factoring.

**Sample use cases:** If banks and incumbent institutions do not seize the opportunity, upstart innovators probably will. This rationale seems to be the motivation behind some early live trials conducted by global banks in partnership with innovators in trade finance blockchain applications to provide a proof of concept.

The Society for Worldwide Interbank Financial Telecommunication (SWIFT) has announced an initiative exploring the use of blockchain in trade finance. Seven major European banks (KBC, Deutsche Bank, HSBC, Natixis, Rabobank, Société Générale and UniCredit) are partnering on a new blockchain-based permissioned trade finance platform, Digital Trade Chain, to manage open account trade transactions for both domestic and international commerce, from initiation to settlement. DTC allows authorized parties to track the progression of those transactions.

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The goal is to cut transaction costs for European businesses, particularly those of modest-sized firms. Similarly, Standard Chartered is leading the Distributed Ledger Technology Trade Finance Working Group (formed under the Hong Kong Monetary Authority's Fintech Facilitation Office) to deliver a proof of concept, developed in collaboration with the Bank of China, Bank of East Asia, Hang Seng Bank and HSBC and Deloitte Touche Tohmatsu.<sup>21</sup>

In another pilot, HSBC joined forces with Bank of America Merrill Lynch and the Infocomm Development Authority of Singapore (IDA) to develop a prototype solution built on blockchain for letters of credit in a smart contract. The consortium used the Linux Foundation open-source Hyperledger Project Fabric (whose development was supported by IBM). In the United Arab Emirates, Infosys has partnered with Emirates NBD and ICICI to deliver the first blockchain based trade finance (and remittances) solution in the region.

**Global payments (remittances).** Cross-border payments is a sector ripe for disruption. Currently, both individual consumers and small- and medium-sized enterprises face high transaction fees, long delays and uncertainty in making cross border payments. Money Transfer Organizations including Western Union, MoneyGram, and Euronet Worldwide spent decades building franchise businesses across the globe. The size of the market is also considerable, with 2016 remittances estimated at over \$601 billion.<sup>22</sup> Today, the global remittance industry takes out \$40 billion annually in fees.<sup>23</sup> Such fees typically stand around two to seven percent of the total transaction value, depending on the volume of the corridor, and foreign exchange fees represent 20 percent of the total cost.<sup>24</sup> Bank wire transfers are even more expensive, with fees of 10 to 15 percent. Banks also tend to focus only on specific corridors with a strong branch network, leaving some corridors without access to the money transfer services they need.

The market segment is already being unbundled by a number of dynamic fintech start-ups such as Transferwise and Remitly (see EMCompass Note 22 on remittances).<sup>25</sup> Blockchain technology can drive efficiency in the process and reduce associated costs for financial intermediaries and customers by: (i) providing a cost-efficient process to establish digital identity and by extension Know Your Customer verifiability; and (ii) providing a digital fiat for currency conversion. With distributed ledger technology, the sender's digital identity profile sufficient for banks and Money Transfer Operators.

A smart contract containing the remittance information delivers the funds directly to the beneficiary's institution while simultaneously notifying the appropriate regulator. Distributed ledger technology could enable new business models (for example micropayments) and institute newer models of regulatory oversight.

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**Sample use cases:** There are numerous startups proposing crypto-based global payments and peer-to-peer digital cash solutions: Abra and Ripple in the United States, BitPesa in Kenya, BitSpark in Hong Kong, OkCoin in China and OkLink/Coinsure in India, Coinnect Mexico/Argentina, Rebit and Coin.ph in the Philippines. In addition, large banks are in the process of testing different applications as consortia and in partnership with technology providers to reduce transaction costs in their value chain. Financial giant SWIFT is participating in the Hyperledger Fabric Project; South Korean bank KB Kookmin is partnering with CoinPlug, Indian ICICI's blockchain is developing a blockchain remittance project with Emirates NBD Bank and others.

#### **Box 1: BitPesa**

Kenyan start-up BitPesa, a company providing foreign exchange and business-to-business bitcoin based payment services in Kenya and several African countries, has been able to leverage the existing financial ecosystem by connecting to the M-Pesa money network, a subsidiary of telecom company safari.com and provider of mobile payments and a major incumbent player (more than half of Kenya's adult population has an M-Pesa wallet).

Despite a legal confrontation with the mobile money network in 2015, BitPesa has raised additional financing from several venture capital firms in 2016 to move forward with its international expansion across East Africa.

#### **Challenges Ahead**

Distributed ledger technology is still evolving and will face numerous hurdles, some technical, some regulatory, and some institutional, as it moves toward maturity. Concepts are being market-tested but they will not be able to reach their full network potential without industry collaboration, common standards, and significant transition costs to enable the migration from the existing financial infrastructure.

On the technological side, concerns relate to the (i) scalability and transaction speed of distributed ledger systems, for permissionless blockchains such as bitcoin (ii) the interoperability of different ledgers and those with the existing legacy systems and transition costs; (iii) network security and resilience of the system against potential cyberattacks (a recent setback for Ethereum); (iv) the protection of data privacy.

The recent rise of customer acquisition costs for crypto payment solutions providers and their continued dependence on traditional networks to reach customers indicates that the market will require the coexistence of both traditional and digital players for some time in order to build bridges to the broader economy.

From the regulatory and governance perspective, we are far from having a clear framework and industry-wide standards that stakeholders will need for full adoption of the new technology. According to a 2017 study by the Cambridge

Center of Alternative, less than half of payment companies based in Asia-Pacific, Europe, and Latin America hold a formal government license, and forty percent of companies surveyed would like to see more regulatory clarity.<sup>26</sup>

Regulation will have to reflect and accommodate the novel features of blockchain and recognize their legal validity (digital identity, Know Your Customer, dispute resolution mechanisms, smart contracts), particularly for open distributed ledger technologies where there is no entity in control of the ledger.

Recent defections from the R3 blockchain consortium have highlighted the governance and design complexities of collectively designing a globally relevant and adoptable solution.

### Conclusion

Financial institutions, fintech technology companies and even governments are still experimenting and participating in proofs of concept to better understand the possibilities and limitations of blockchain. As financial markets evolve with respect to distributed ledger technology, companies will face game-theory-type decisions. Being early adopters of distributed ledger technology across the ecosystem may provide them with a competitive advantage but it may also derail their ongoing business interests.

If they are too late to enter the market, they may irreversibly lose ground to competitors. This dilemma is exacerbated by the fact that the biggest impact from distributed ledger technology will be achieved only when a critical mass of the ecosystem participates and network effects are realized.

The most valuable distributed ledger innovations cannot be developed in isolation; they require collaboration among participants, exchanges, and regulators. The adoption process will not be smooth and there will be winners and losers.

With respect to emerging markets, the ecosystem seems fertile for adoption, propelled by high demand, particularly in serving financially excluded segments, as well as a hedging strategy through bitcoin and other crypto currency in conditions of currency instability and political risk, as is the case in parts of Latin America and Africa.

Less financially developed markets are focusing on financial inclusion initiatives with blockchain-run digital wallets and mobile payments. In addition to the factors identified in the predictive framework based on market structure (see EMCompass Notes 40 and 41), three additional critical success factors can weigh heavily on the penetration of the technology. These are: (i) the degree of development of the general technological ecosystem and the availability of the requisite skill pool; (ii) the ability to mobilize capital for innovators; and (iii) a regulatory environment that encourages experimentation and public-private collaboration to establish standards and resolve related issues.

Innovation is only as good as the effectiveness and profitability it can deliver. This is the promise that distributed ledger technology-associated initiatives will be called on to deliver in a sustainable fashion, whether in the form of creating/growing a market or generating cost savings through greater transparency and efficiency. Only then will move beyond the pilot stage to full-scale industry adoption, thereby leveraging the full network effects and triggering the tipping point of the transformation process. ■

*“Experiment patiently, accept failures, plant seeds, protect saplings, and double down when you see customer delight.”—Jeff Bezos, CEO, Amazon.com, Letter to Shareholders, 1997.*

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### Additional EM Compass Notes about Blockchain

This note is the third in a series of five complementary EM Compass Notes by this author: The notes focus on: (1) a general overview of blockchain technology (Note 40), (2) an outlook for blockchain’s implications for emerging markets (Note 41); (3) a general overview of the impact of blockchain on financial services (this note), (4) an emerging market regional analysis of blockchain developments in financial services (Note 44) and, (5) implications of the technology beyond financial technology (forthcoming).

Please also refer to EM Compass Note 38, “Can Blockchain Technology Address De-Risking in Emerging Markets?” by Vijaya Ramachandran and Thomas Rehmann, for how blockchain can be used to mitigate de-risking by financial institutions, which affects recipients of remittances, businesses that need correspondent banking relationships.

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