CAN BLOCKCHAIN UNLOCK THE INVESTMENT AFRICA NEEDS?

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Through the UN Sustainable Development Goals (SDGs), global stakeholders have converged around the ambitious vision to end poverty and engender prosperity for all. Consensus projections suggest that an additional $2.5 trillion in annual financing will be required to meet these objectives. Estimates of how much is needed in Africa alone are upwards of $1.2 trillion a year.[1.] Ignoring the question of whether this level of new investment is appropriate or plausible, attracting it likely will mean transforming not just a few countries but the majority of the African continent into a global investment destination.

While Africa is often cited as the next and final frontier for capital, investment allocation to the continent continues to lag. Although democratization, rising income levels, vast natural resources, and increasing market connectivity could present a differentiated and compelling opportunity for global investors, these variables have not yet translated into large-scale capital flow. African foreign direct investment inflows in 2017 were $42 billion, just 2.9 percent of the global total.[2.] Despite its raw potential, Africa is not yet competing successfully in the global capital markets.

Investors seek opportunities in regions that have clear market infrastructure, competitive workforces, and stable public institutions, all of which are underpinned by data that many African countries lack. Every year, banks package and sell upwards of $13 trillion in new debt and equity securities in the global capital markets, and behind each dollar raised in these offerings are data that allow investors to price risks and returns, compare opportunities, and ultimately justify their decisions. Considering that fewer than 15 percent of African countries use the UN System of National Accounts to measure macroeconomic indicators, and that almost 50 percent of the African population resides in countries where ownership of agricultural land is unknown, what these markets ultimately lack is an evidence base.[3.] Indeed, there is a vicious cycle in which perceived risk limits deal flow, which in turn limits building a more

robust dataset to overcome those perceptions.

On the positive side, while African markets lack a deep dataset, they frequently also lack the legacy systems that slow the adoption of new solutions. For example, in 2014, consumers in the United States marveled at the launch of Apple Pay, a mobile payment technology. By that time, people in Kenya had been using the mobile payment system M-Pesa for over seven years. While a lack of financial services infrastructure certainly has been a limiting factor in Africa, from a forward-looking perspective it also offers a leapfrogging opportunity. In this respect, does Blockchain technology—one of the latest breakthroughs in our data-driven future—hold transformational potential to provide the clarity global investors need to make the decision to channel their capital to African markets?

So what is Blockchain technology? Blockchain can be thought of as a type of database. However, unlike a traditional database that is managed by a single administrator, a blockchain database is managed by a large network of participants that all work to create consensus about the information they are storing. This approach to managing data has numerous benefits, such as increasing transparency and auditability, reducing the need for trust between users of information, and, ultimately, democratizing the value of data assets.

In clear-eyed terms, can this new approach to managing data help African markets finance their SDGs? Proponents of Blockchain cite its potential to reimagine entire systems, supply chains, and societal constructs—precisely the level of change needed to achieve the SDGs. Fundamental ingredients needed to attract the level of investment that will

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propel that change are (1) clear financial markets infrastructure, (2) effective human capital systems, and (3) stable public institutions. These three areas work in concert based on data, and they themselves also require investment. In this paper, we assess Blockchain's potential to provide the data foundation needed to upgrade these systems as African countries seek to fulfill their development objectives.

FINANCIAL MARKET INFRASTRUCTURE

Wealth is stored in assets. Clear title to assets—both real property and financial assets such as stocks and bonds—is a prerequisite for liquidating those assets and using the proceeds to finance other activities. Financial market features such as collateral registries and credit-scoring services also are fundamental to delivering lending and other financial services. This infrastructure relies on consistent and accurate data, and it is critical to building deep and liquid financial markets. Unfortunately, in many African countries the institutions that facilitate wide market participation and ensure local resilience are nascent, and in some cases nonexistent.

Blockchain is capable of tackling the challenges African countries face as they continue to build their financial markets infrastructure. Allowing lenders and investors to capture and verify new sources of information and to store that information securely makes it possible to form markets. The fear that collateral might be pledged to multiple lenders could be eliminated, thereby unlocking financing for small businesses, while the on-time payment of bills could enable individuals to build credit histories and attract loans at reasonable rates. If African markets can develop in this balanced way, they will be able to attract more investment while also allowing broader segments of the population to build wealth.

One example of Blockchain taking on the market infrastructure challenge is a Ghanaian company called Bitland. Bitland allows individuals and organizations to record deeds and survey land on the BitShares Blockchain. With a combination of remote workers and key partnerships, Bitland seeks to help regulators resolve land disputes in areas currently beyond their reach. By eliminating this type of dispute, Blockchain could bring asset ownership—the fulcrum of the middle class—to the world's most vulnerable.

While Blockchain offers an exciting new way to track information that can catalyze market formation, our expectations must be realistic. Lending and investing money and delivering services are complex endeavors that span diverse legal and regulatory frameworks and involve many system interdependencies at the domestic and international levels. For example, the Financial Stability Board, the Bank for International Settlements, and others are contemplating international regulatory regimes for Blockchain to try to address cross-border issues related to data transmission and storage. Moreover, from the legal perspective, precedent is critical, and while Blockchain may be immutable in math it is not yet immutable in court. If Blockchain use cases remain focused on disruption, the technology too will remain unprecedented, which is great for marketing but terrible for driving large-scale change.

Furthermore, from a systems dependency perspective, global investors remain committed to and beholden to data sources and approaches that instill credibility and reduce the risk of criticism in the event of a bad outcome. Blockchain solutions should strive for interoperability with the actuarial tables, credit ratings, Basel risk-assessment frameworks, and

other traditional data so investors can leverage Blockchain as a credible means of justifying decisions. Existing systems that serve large swaths of the population and enable them to accumulate wealth must remain in place until Blockchain policies and adoption are widespread enough to avoid creating new gaps in access.

HUMAN CAPITAL SYSTEMS

An agile workforce, armed with proper education and skills and secured by ready access to quality healthcare, is foundational to the social and economic stability investors seek. Unfortunately, in many African countries these human capital systems are incapable of producing globally competitive populations. According to UNESCO, more than one-fifth of African children between ages 6 and 11 are not in school, and that proportion increases to 60 percent for youth ages 15 to 17.[4] Healthcare is challenged to a similar degree. One particularly tragic and acute example occurred in 2015, when Liberia's 4.3 million people faced down an Ebola epidemic with only 117 resident doctors.[5] Unbelievably, less than 50 percent of Africa's population has access to modern health facilities.[6]

Whether delivered by the public or private sector, the deficiencies of the human capital systems in many African markets can be traced to underinvestment resulting from poor data. In the public sector, governments lack the track record, operational data, and credit ratings to access sufficient capital to enable them to build high-quality systems. As a result, public systems are plagued by shortages of skilled workers, corruption that diverts resources away from service delivery, and an inability to adapt to the needs of changing populations. In the private sector, due to underdeveloped public systems, individual service providers take on outsized burdens that result in increased costs, which often makes them unattractive to investors. In effect, the systems cannot deliver effective services because they cannot raise sufficient capital, due to a lack of credible data that give investors confidence.

Blockchain technology has numerous features that are attuned to these challenges and could help unlock the investment needed to upgrade systems for creating human capital in Africa. One of Blockchain's key features is improved accountability and reduced misconduct. In a Blockchain, data storage and permissions are distributed, which makes the construct more resilient and helps eliminate duplication, waste, and bad actors through independent verification and public auditability. In this way, creating stronger data linkages between providers and consumers would enable stronger organizational forecasting, which in turn could enhance overall system effectiveness. Addressing these types of issues is key to attracting additional financing for human capital delivery systems.

Security is the second feature of Blockchain that is particularly relevant to attracting investment for human capital formation. Whether financing service providers, such as hospitals, schools, or municipalities, or financing consumers through a bank or insurance company, an organization's success depends on its ability to safeguard personally identifiable information. Blockchain is a highly secure approach to storing and sharing data, and many Blockchains use asymmetric cryptography as the basis for authentication, integrity verification, and permission enforcement. This form of cryptography uses two keys—a public key and a private key—to encrypt and decrypt information, and the use of one key cancels out use of the other. Although it is a common misperception that Blockchain is 100 percent secure, if properly structured and imple-

mented, Blockchain systems are highly secure and organizations could use them to protect critical information.

BlockRx is one organization that is using Blockchain to improve the effectiveness of human capital systems, health systems in particular. The goal of BlockRx is to interconnect disparate stakeholders and facilitate the safe transfer of information. By building a network of trusted partners across the healthcare system—including life science researchers, pharmaceutical companies, device manufacturers, and healthcare providers—the technology establishes data provenance. This type of solution could be particularly impactful in Africa, the region in which people have the highest probability of dying from malaria, due in no small part to the fact that upwards of 50 percent of the drugs sold to treat the illness are counterfeit.[7] Establishing the veracity of data is critical to attracting the capital required to operate legitimate systems that will produce better outcomes.

Despite Blockchain's potential to help attract investment in human capital systems, we must be careful. The long-term benefits seem clear, but in the short term Blockchain could harden the existing asset allocation paradigm. Blockchain is not artificial intelligence and strong data alone are not capable of driving human capital formation in African markets; they must be accompanied by strong interpretation and operating strategies. To the extent that those components are less compelling in Africa, investment could continue to flow to other areas, emboldened by data that prove that African systems are not ready.

Blockchain also presents an interesting paradox for investments in human capital. Distributing accountability creates strength in numbers, but it also diffuses responsibility. For instance, as health data are appended to a Blockchain, questions remain as to where individual and/or institutional accountability lies in a diffused system. Without accountability, who will Africa's most vulnerable call on when an intervention goes wrong?

PUBLIC INSTITUTIONS

The third foundational ingredient for enabling African markets to attract investment is stable public institutions. These institutions—the electoral and judicial processes, and all manner of public systems that confer the expectation of fair adjudication—are pivotal to transcending parochial interests and creating broad-based prosperity. In telling the story of John Githongo, who was forced into exile after attempting to confront public-sector corruption in Kenya, Michella Wrong conveys the stakes: in effect, African markets will not develop so long as corrupt public institutions are preserved in the name of tribal distrust.[8]

From an investor's perspective, lack of government transparency and high levels of political volatility are particularly potent sources of uncertainty that prevent the confident pricing of risk. Disputed elections, new administrations defying contracts executed by prior administrations, and seismic policy shifts are common explanations for negative investment decisions. According to the World Trade Organization, there is a positive and strong relationship between inflows of foreign direct investment and transparency, which means that those governments not acting transparently attract less financing to support their development.[9] An entire market—the political risk insurance market—has developed to address this challenge, but its scale is wholly insufficient to alter the arc of progress in a fundamental way. Increasing investment to the level that would facilitate achievement of the SDGs in Africa will require finding solutions to the underlying political risks.

Blockchain could help build confidence in African countries' public institutions. For one thing, because Blockchain databases are distributed, they do not rely on a central authority. This could redefine the nature of trust within a system and legitimize the information being stored. Although participants in a Blockchain need to trust its underlying cryptography and system architecture, there would be less pressure on those that were previously the sole arbiters of information.

Blockchain also creates a clear public trail of transactions. While not totally immune to manipulation—for example, collusion could occur in a Blockchain that is not sufficiently dispersed, or malicious actors could leverage a time advantage to create and validate fraudulent transactions[10.]—this audit function provides enhanced transparency and accountability. In effect, reducing corruption and ensuring fairness are key to strong public institutions—and they also are the foundation of Blockchain.

Headquartered in Cleveland, Ohio, Votem is an example of a company using Blockchain to strengthen public institutions by taking on distrust and inefficiency in the electoral process. Founded in 2014, the company has built a mobile voting platform that uses Blockchain to create a secure, end-to-end online voting system. Votes are verified and counted in real time, which increases efficiency for the election organizers, and the entire online Blockchain voting process can be audited at any point, thereby decreasing the risk of fraud, tampering, or controversy. If implemented along with policies that recognize Blockchain-counted results as a legal threshold, this type of service could foster transparency and strengthen the bond between government institutions and citizens. Furthermore, from an investment perspective, eliminating the stress of contested elections and the resulting social unrest will enable investors to see beyond the next election cycle and to make investments that will allow African markets to march to the beat of a steadier drum.

With all these advantages in mind, we also must be honest about the implications of using Blockchain to build stable democratic institutions. Technology is powerful, and the point of Blockchain is to disperse power; however, this is not the first technology to promise democratization. In his classic work, *The Impact of Science on Society,* Bertrand Russell made the point that technological progress always has a downside, typically for the working classes.[11.] For example, information technology and telecommunications are routinely touted for their great ability to decentralize power, when in fact they themselves are great concentrators of power. They give the institutions at the center the capability to react to and benefit from information directly, thereby expanding their influence. The ultimate vision of many Blockchain proponents is to eliminate the need for central intermediaries; however, a more probable and undesirable outcome will be fewer intermediaries, which has the attendant potential to create a new generation of technology oligarchs. This could prove detrimental, particularly if these intermediaries serve as gatekeepers between citizens and their public institutions.

There also are a number of tactical limitations when using Blockchain to enhance public institutions. First, while Blockchain can help produce an evidence base, its power to enact change will be stunted if it has no legal standing. Much like DNA testing in the U.S. legal system, it will take time for the immutability of Blockchain to meet a legal threshold—or even for the technology to be adopted and implemented. Second, a Blockchain cannot assess the veracity of information originating outside its system. For example, because Bitcoins are created within a

Blockchain ecosystem, that Blockchain is able to determine whether those Bitcoins and each trade associated with them are authentic. In contrast, in areas that lack adequate mobile or Internet penetration, voters' ballots will be cast outside a Blockchain and a third party will, as usual, be required to legitimize them. While Blockchain can help build trust in institutions that will allow African markets to attract more capital, it cannot do it overnight or in one single shot.

CONCLUSION

Attracting the capital needed to achieve Africa's SDGs will entail making substantial improvements in the continent's financial market infrastructure, human capital systems, and public institutions. Data are key to unlocking that investment, and many observers of technology and development see Blockchain technology as the answer. But realizing the potential of Blockchain is complex. By capturing new sources of information, Blockchain could create more inclusive financial markets that enable broader participation. However, financial markets are built on multifaceted regulatory frameworks and longstanding systems dependencies that must be addressed. Blockchain also could enhance efficiency and eliminate waste when upgrading systems to create human capital, such as education and healthcare, but without strong organizational transformation strategies, more effective data management would likely have only a limited impact on service delivery. Lastly, while Blockchain could increase trust in public institutions, having legal standing is critical for the technology, as are third-party verification methods that ensure universal participation in areas without full digital coverage.

Ultimately, although no one denies the urgency of the SDGs, development problems are generational beasts and it takes time for society to absorb new technology. For example, the iPhone represents the culmination of a nearly half-century journey to package and scale technologies that include the Internet, GPS, signal compression, lithium ion batteries, and others.[12.] While climbing that long on-ramp, we endured an Internet bubble, created digital-driven business models to deliver services to the masses, and grew entirely new supply chains to scale. It takes time to leverage technologies in ways that can benefit the most people, and we also should be careful about use cases so we can ensure that real-world outcomes remain the focus of implementation. Data and technology-driven data enhancements will be critical to bringing African markets into the risk-priced world of global investment; however, we must remain vigilant in order to minimize unintended consequences along the way. Regardless of whether Blockchain proves to be an innovation that helps Africa fulfill its SDGs, active debate around potential solutions is a key step in attacking challenges that have gone unsolved for far too long.

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