POLICY BRIEF

The Economics of Blockchain Within Africa

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The context

The advent of blockchain technology offers massive potential for revolutionary innovations that address fundamental constraints and market failures across a wide span of sectors in Africa. Blockchain has the ability to transform economic activity and improve living standards in Africa by overcoming information asymmetry problems, property rights and governance barriers. Blockchain innovations have the ability to boost levels of productivity and unlock capital flows to underserved sectors, in addition to leveraging the increasing returns of information as an input to production in order to spur economic growth. This

background paper discusses the recent advances in blockchain technology within Africa, investigates the underlying economic principles of blockchain networks, both universally and in an African context, and discusses the data governance issues that arise within the context of the large volumes of data generated by blockchains. It reviews the enabling infrastructure and supporting technology, including digital identity. Finally, it gives policy recommendations to increase the uptake of blockchain technology on the continent.

The problem

The contributions of this background paper are fourfold: i) to map blockchain innovations across the continent, identifying countries and economic sectors that are leading the adoption of blockchain technology; ii) to identify constraints in the enabling infrastructure that are impeding the adoption of blockchain in sectors with a high potential of impact, including contract enforceability in countries with large informal markets; iii) to identify issues that arise from the collection of data within blockchain networks distributed across countries, and inequalities that may result from the adoption of blockchain across income and demographic segments; and iv) to provide policy recommendations to create a conducive regulatory framework for the use of blockchain within Africa, to improve productivity and governance while protecting individual rights to data privacy.

Blockchain is a relatively new technology that has seen rapid global growth since its first commercial implementation in 2008. A blockchain is a digital ledger of transactions that is duplicated and distributed across a network of computer nodes. Entries are stored in the ledger as a chain of blocks, where each block contains transaction data. Blockchain networks do not have a central trusted authority or clearinghouse to verify data, but instead employ algorithmic mechanisms to introduce costs that discourage malicious behavior.

Leading innovators in blockchain technology within Africa are Nigeria, South Africa and Kenya. These countries account for over 80 percent of blockchain innovations. Within these countries, the major innovations are in finance and insurance, internet and telecommunications, and the health sector. The most widespread applications across the continent are in cryptocurrency trading, followed by payments and cross-border transactions. Countries with high currency depreciation risk and capital controls have tended to be the first adopters of cryptocurrencies in order to protect against inflation. Central banks in Africa and around the world have begun to explore the possibility of introducing central bank digital currencies (CBDCs), with Nigeria, South Africa and Mauritius in the development stage. The traceability aspect of blockchains has contributed to its adoption in industry to ease the complexity and opacity of processes within supply and value chains, thereby improving logistical

efficiencies. Blockchain has also increased the transparency of property rights and facilitated proof of asset ownership, in turn unlocking access to resources and lowering credit rationing.

Blockchains are immutable records of information that encode some form of economic activity, such as the value of an asset or evidence of a transaction. Hence, the economics of blockchains builds upon the foundations of the economics of information. Information is non-rival and partially excludable, and therefore is infinitely usable at any moment in time and without depletion over time. These properties contribute to massive positive externalities from the use of information, and increasing returns to scale that contribute to higher levels of productivity.

By virtue of their transparency, public blockchains eliminate the need for a central intermediary and therefore improve allocational efficiency. These networks therefore eliminate the ability of those with privileged status in centralized networks to extract rents, or those with incentives to hoard data to extract rents by excluding others from access to data. The transparency and verification of information within blockchain networks also overcomes imperfect information constraints, thereby improving the efficiency of contracting.

Blockchains have the ability to form the basis of smart contracts whereby the fulfilment of obligations by contracting parties is embedded and executed automatically, thus ensuring contract enforceability by precluding the ability of contracting agents to renege on their promises at a future date. Smart contracting has great potential particularly within informal labor markets in Africa, where information problems are particularly acute. In addition, blockchain innovations can help improve institutional governance by enhancing the transparency of legal and judicial processes, thereby improving the accountability of public officials. This can help speed up the improvement of governance across the continent, where there is a need to improve the quality of institutions and enforce the rule of law.

Although blockchains provide a decentralized solution to overcome challenges related to asymmetric information, they do not overcome the costs of verification. The implementation of blockchains is costly, and is dependent on the use of an energy-intensive verification mechanism within a proof-of-work context. Further, while blockchain can improve transparency, it is not possible for blockchain to enforce the transfer of physical assets. While blockchain is an impactful solution, it does not resolve public sector incentive compatibility constraints as it does not address private incentives that agents face in deciding contractual obligations. Additionally, the excludability of information generates incentives for those who collect big data to over-invest in data collection and to hoard their data, while at the same time incentivizing under-investment in data privacy, thereby generating negative externalities.

Implications for policymakers

While blockchains carry transformative potential for Africa, the realization of this potential is unlikely to happen without an enabling and conducive policy and regulatory framework. No regulatory authority within Africa has issued any regulations on the use of blockchain technology, although Mauritius and Kenya have created regulatory sandbox environments to provide innovators in financial institutions with licenses to practice.

A successful blockchain policy for Africa must be an integrated policy, and must also promote the development of an enabling environment by closing access gaps in social and physical infrastructure, in order to improve the low levels of digital access across the continent. This necessitates lowering the costs of access to data. Failure to close the digital access gap may leave those without access behind and contribute to a widening gap in living standards.

Blockchain policy and regulatory frameworks must be incentive-compatible, and must internalize the private incentives of network participants, in order to overcome suboptimal outcomes such as data hoarding and data underutilization. In addition, incentive-compatibility concerns must be addressed in order to expand the utilization of blockchain to improve governance and transparency particularly within the public sector, where massive improvements in efficiency and positive externalities stand to be gained from the application of blockchain for
contract enforcement.

A cross-continental regulatory framework for blockchain must address jurisdictional issues that arise due to the distributed nature of blockchain networks, where it is unclear where agents sit. Given that the nodes of a decentralized ledger can span multiple locations around the world, there is a risk that transactions performed by an organization could fall under every jurisdiction in which a node in the blockchain network is situated, resulting in an overwhelming number of laws and regulations that might apply to a certain transaction. Agent domicile is also important particularly from the perspective of recognizing income for taxation purposes, as well as building appropriate structures for taxation. Poor coordination in establishing taxation frameworks can result in multiple taxation, competition or conflict across authorities in the recognition of revenues or asset gains within blockchain networks, for the purposes of establishing tax bases.

The lack of a centralized coordinator increases the vulnerability of blockchains to volatile fluctuations, and limits the ability of a central authority to intervene as a consequence of the volatility. This property is particularly prevalent in cryptocurrency markets. It raises the concern that without appropriate regulation, there could

potentially be welfare-reducing swings in volatility, and makes the case for a regulatory authority. However, cryptocurrencies by nature have no specific legal and regulatory jurisdiction due to their global portability, making it difficult for policymakers to develop cryptocurrency regulations.

Appropriate regulatory infrastructure must implement checks and balances to protect data privacy and to avoid data-based discrimination. Optimal regulation will balance the productivity gains of data utilization against individual utility for privacy, and protect against the unauthorized sharing of data. In addition, regulations must guard against potential discriminatory biases embedded in data-driven innovations, which could potentially entrench racial or social inequalities. The assignment of rights and obligations over data to consumers may provide an optimal outcome if complemented with the development of markets for the sale of data.

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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