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Banking on Blockchains: A Transformative Technology Reshaping Latin American and Caribbean Economies

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Banking on Blockchains: A Transformative Technology Reshaping Latin American and Caribbean Economies

Robert W. Rust, II*

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I. INTRODUCTION

Money laundering, terrorism financing, and tax-evasion—three things that are synonymous with Latin American and Caribbean banking.¹ And unfortunately for small, regional banks in these areas, this reputation is finally taking its toll. Thanks to drug lords in Colombia, ISIS inspired citizens in the Caribbean, and ultra-rich foreigners who house untaxed money in offshore accounts in the Cayman Islands, global banks have begun to cut ties with these areas' regional banks. This is the result of rising compliance and regulatory costs associated with customer due-diligence.² This phenomenon is known as “de-risking” and is impeding Latin American and Caribbean citizens and businesses alike from participating in global financial markets and economic opportunities.³ Banks are terminating these once prosperous relationships because of increasing regulatory pressures from international organizations and governments to combat money laundering, terrorism financing, tax-evasion, and the exchange of child pornography.⁴ In 2010, for example, the United States meted out \$161 million dollars in fines because banks failed to meet regulatory compliance for customer due-diligence.⁵ By 2015, these fines increased by sixty-five percent to more than \$2.6 billion dollars.⁶ Ultimately, the cost of due diligence fines have discouraged U.S. banks from maintaining a relationship with banks in Latin America and the Caribbean, damaging economic security and the financial innovation in the regions.⁷ Banks cite increasing costs associated with due-diligence in their decisions to terminate ties

¹ Robert Crane Williams, *Prospects for blockchain-based settlements frameworks as a resolution to the threat of de-risking to Caribbean financial systems*, ECON. COMM'N FOR LATIN AM. AND THE CARIBBEAN (Apr. 2017), http://repositorio.cepal.org/bitstream/handle/11362/41139/1/LCCAR2017_2_en.pdf.

² *Id.* at 8.

³ *Id.*

⁴ International Finance Corporation, *Mitigating The Effects Of De-Risking In Emerging Markets To Preserve Remittance Flows*, THE WORLD BANK (Nov. 2016), <https://www.ifc.org/wps/wcm/connect/68a895a7-dc34-48fd-9c80-215b0fdc6da4/Note+22+EMCompass+-+De-Risking+and+Remittances++FINAL.pdf?MOD=AJPERES>.

⁵ *Id.*

⁶ *Id.*

⁷ Williams, *supra* note 1, at 8.

with correspondent banks.⁸ The reason why is because due-diligence requires banks to spend exorbitant amounts of money to figure out exactly who the person they are dealing with is and where their money is going.⁹ Current financial systems are poorly equipped to make this information readily accessible and transparent, making these searches laborious and resource intensive.¹⁰

Blockchain technology can remedy this situation in two ways. First, blockchain can help by decreasing regulatory and compliance costs while making transactions more transparent, ultimately incentivizing banks to reform these once profitable relationships. And second, blockchain technology can be used in conjunction with cryptocurrencies to leap-frog correspondent banks all together, allowing small banks to interact with global markets in peer-to-peer transactions. This nascent technology has the capabilities to achieve both goals through its permanent, irreversible, and decentralized features.

This Note explores how blockchain technology can mitigate de-risking in Latin America and the Caribbean and why this technology should be adopted over other solutions. Part II of this Note addresses why the phenomenon of de-risking is occurring in these regions and what its ultimate effects are on governments, businesses, and individuals. Part III of this Note explains what blockchain technology is, how it works, why it is often misunderstood as Bitcoin, as well as what the advantages and disadvantages of this technology are with regards to being a financial banking tool. Part IV of this Note recommends blockchain as a solution to reducing compliance costs for banks and making transactions more transparent. Finally, Part V of this Note concludes on the ultimate effects this technology may have on the banking industry in these regions.

II. BACKGROUND

A. *Identifying the Problem*

Latin America and the Caribbean are drawing the short-end of the stick in today's global economy. One of the leading causes of

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

this unfortunate situation is due to “de-risking.” De-risking is a banking term given to the tendency of banking institutions to sever working relationships with other financial institutions because the cost of regulatory compliance with that partnership is deemed too high in comparison to the returns.¹¹ These relationships are being terminated due to increasing pressures from international organizations, governments, and other entities in their attempt to combat money laundering, terrorism financing, and tax evasion; much of this stems from the 2001 Patriot Act that requires increased due diligence into foreign accounts.¹² Parallel to this initiative of increased due diligence is the desire for capital to move efficiently, flowing into markets that are both competitive and developing.¹³ Unfortunately, these competing goals often collide, impeding capital-flow from reaching markets that are burdened by illegal and opaque transactions. The result is a stunted economic outlook for these regions as financial services and cross-border flows are disrupted—trade finance, remittances, and aid flows—undermining financial stability and limiting financial inclusion opportunities.¹⁴ Gastone Browne, Prime Minister of Antigua and Barbados, reiterated this view when he expressed deteriorating banking relationships in his home country: “without [correspondent banks] th[is] region would be excluded from the global finance and trading system with grave consequences for maintenance of financial stability, economic growth, remittance flows and poverty alleviation.”¹⁵

The intersection of these policies to manage risk and use capital efficiently leaves banking institutions at a crossing: banks can either (1) increase their regulatory costs of performing extensive customer due-diligence to avoid penalties or (2) sever ties with these relationships.¹⁶ The recent trend has been the latter. For example, an Inter-American Development Bank assessing the de-risking situation in

¹¹ Williams, *supra* note 1, at 7.

¹² International Finance Corporation, *supra* note 4.

¹³ *Id.*

¹⁴ *Id.*

¹⁵ Paul Taylor & Juan Martinez, *De-Risking and Financial Inclusion*, ASS’N OF CERTIFIED ANTI-MONEY LAUNDERING SPECIALISTS LLC (Mar. 6, 2017), <https://www.acamstoday.org/de-risking-and-financial-inclusion/>.

¹⁶ International Finance Corporation, *supra* note 4.

Jamaica expressed this view: “due diligence and monitoring of clients is costly, and the incentive for banks to simply refuse certain kinds of clients is strong.”¹⁷ Latin and Caribbean nations, specifically, have felt the brunt of these terminated relationships as these affiliations were formerly their avenues to global markets and financing through correspondent banking schemes.¹⁸

Correspondent banking relationships are a mechanism in which one bank provides services on behalf of another.¹⁹ Usually, under this scheme, a larger bank residing in a major economy, like the United States or Europe, services a smaller bank residing in a smaller, developing economy—Latin America or the Caribbean.²⁰ By using correspondent banks that are tethered to major global hubs, residents in small, developing economies gain access to international money transfers and foreign exchanges.²¹ Correspondent banks are crucial players in the global economy, accounting for trillions of dollars in cross-border transactions.²² Despite this, the trend of de-risking remains prevalent: a report by the World Bank in 2016 found that fifteen percent of large global banks are withdrawing from correspondent bank relationships, with this initiative led by U.S. banks.²³ Even in cases where correspondent banking relationships are not terminated, the effect of de-risking remains chilling.²⁴ For example, customers of banks are being turned away because their businesses are deemed not transparent enough or excessively risky.²⁵

Correspondent banks, especially in Latin America and the Caribbean, bear the cost of termination from major banks due to their well-documented history of providing avenues to financing illegal

¹⁷ Williams, *supra* note 1, at 8.

¹⁸ *Recent Trends In Correspondent Banking Relationships—Further Considerations*, INT’L MONETARY FUND (Mar. 16, 2017), <https://www.imf.org/~media/Files/Publications/PP/031617.ashx>.

¹⁹ *Id.*

²⁰ *Id.* at 31.

²¹ *Id.*

²² International Finance Corporation, *supra* note 4.

²³ *Id.*

²⁴ Williams, *supra* note 1, at 8.

²⁵ *Id.*

activity.²⁶ Recent allegations aver that Caribbean nationals are traveling to Syria to join the Islamic State, leading to growing concerns of terrorism financing.²⁷ Further, the Caribbean and Latin America have a documented history of money laundering from narcotics trafficking as well as secret accounts associated with off-shore banking.²⁸ Many countries in these regions have sought to escape this past, voluntarily working with international compliance bodies like the Financial Action Task Force (“FATF”).²⁹ During the 27th Inter-session meeting of the Conference of the Heads of Government of the Caribbean Community (“CARICOM”) held on February 16-17, 2016, heads of governments from a variety of Caribbean nations met to address the issue of de-risking in their communities and to find solutions to solve the problem.³⁰ Despite these measures, de-risking continues in these regions, harming governments, business, and individuals.

B. Who Loses?

The losers of de-risking are primarily the poor and economically vulnerable.³¹ This is due to corresponding banks’ ability to facilitate remittances.³² Remittances are monies sent from one country to another.³³ Remittances traditionally occur when a relative or family member leaves home to find a better life somewhere else. Once this better life is achieved, these prosperous individuals send monies back home to support family members.³⁴ Per the World bank, in 2016, over \$574 billion dollars were sent by migrants to relatives in

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

²⁹ Williams, *supra* note 1, at 8.

³⁰ International Finance Corporation, *supra* note 4.

³¹ *Id.*

³² Manuel Orozco, *Remittances to Latin America and The Caribbean In 2016*, LEADERSHIP OF THE AMERICAS (Feb. 10, 2017), <http://www.thedialogue.org/wp-content/uploads/2017/02/Remittances-2016-FINAL-DRAFT.pdf>.

³³ Brent Radcliffe, *Introduction To Remittances*, INVESTOPEDIA (Nov. 16, 2017), <https://www.investopedia.com/articles/economics/10/introduction-remittances.asp>.

³⁴ *Id.*

their home countries.³⁵ Remittances, for example, made up 22.7% of Haiti's GDP in 2016, illuminating how important these transactions are for small, developing countries.³⁶ In 2014, the Inter-American Development Bank reported that remittances received by Latin American and Caribbean countries from around the world reached \$62.4 billion, tripling since the year 2001.³⁷

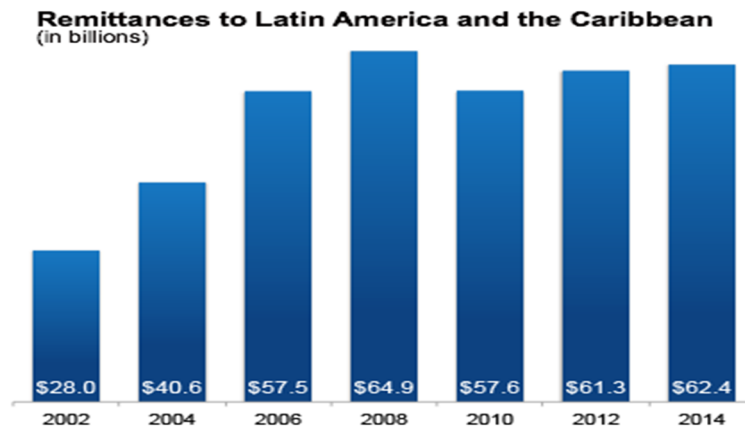


Figure 1: Remittances to Latin America and the Caribbean³⁸

Remittances are crucial to these regions for several reasons. First, remittances provide financial relief at the household level and increase foreign exchange earnings.³⁹ Remittance money is often used to buy imported goods, pay overseas education tuitions, and obtain medical care.⁴⁰ Without corresponding banks to facilitate these transactions, payments of these bills become difficult or in some severe situations, impossible.⁴¹ Second, remittances give developing countries the ability to fund development on their own

³⁵ *Migration and Remittances Data*, THE WORLD BANK (Jan. 24, 2018), <http://www.worldbank.org/en/topic/migrationremittancesdiasporaissues/brief/migration-remittances-data>.

³⁶ Amelia Josephson, *What Are Remittances?*, SMARTASSET (May 1, 2017), <https://smartasset.com/credit-cards/what-are-remittances>.

³⁷ *Remittances to Latin America and the Caribbean*, FED'N FOR AM. IMMIGRATION REFORM, <https://fairus.org/issue/workforce-economy/remittances-latin-america-and-caribbean> (last visited Mar. 15, 2019).

³⁸ *Id.*

³⁹ *Id.*

⁴⁰ Taylor & Martinez, *supra* note 15.

⁴¹ *Id.*

terms.⁴² While debate exist as to what remittance monies go toward, some economists think these funds develop domestic financial systems. This occurs when individuals save remittance money and make loans to local businesses.⁴³

Another loser of de-risking are countries who are reliant on trade.⁴⁴ For these countries, the loss of correspondent banks has extreme consequences, including “lower exports and imports as bank customers are unable to send or receive foreign payments and maintain business relationships with foreign customers and suppliers.”⁴⁵ The effects of these consequences create vicious cycles for businesses as a loss of foreign partnership typically lowers revenues, making it more difficult for these firms to pay back bank loans.⁴⁶ From this, weakened banks struggle to circulate money through loans, leading to slow, and even sometimes, stagnate growth.⁴⁷ Even more, a weakened and less effective banking community represents significant deterrents to foreign direct investment (“FDI”).⁴⁸ The effects of de-risking are already being felt, for example, as FDI in Latin America and the Caribbean declined by 7.9% or \$167.043 billion dollars in 2016.⁴⁹ To make matters worse, numerous studies have shown a nexus between FDI and technological advancement, painting a bleak and troublesome picture for these regions moving forward.⁵⁰

This ultimately begs the following question: what solutions can be imposed to reform these once viable relationships, which have

⁴² Radcliffe, *supra* note 33.

⁴³ *Id.*

⁴⁴ James A. Haley, *De-Risking: Effects, Drivers and Mitigation*, CENTRE FOR INT’L GOVERNANCE INNOVATION (Jul. 2017), <https://www.cigionline.org/sites/default/files/documents/Paper%20no.137web.pdf>.

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ Nu Cepal, *Foreign Direct Investment in Latin America and the Caribbean 2017*, ECON. COMM’N FOR LATIN AM. AND THE CARIBBEAN (Oct. 2017), <https://www.cepal.org/en/publications/42024-foreign-direct-investment-latin-america-and-caribbean-2017>.

⁵⁰ Cem Tintin, *Does Foreign Direct Investment Spur Economic Growth and Development? A Comparative Study*, EUROPEAN TRADE STUDY GROUP (Aug. 2012), <http://www.etsg.org/ETSG2012/Programme/Papers/73.pdf>.

the potential to rejuvenate Latin American and Caribbean economies? The International Monetary Fund (“IMF”) believes that this begins by “enhance[ing] respondent banks’ capacity to manage risk, improve[ing] communication between correspondent and respondent banks, [and] strengthen[ing] and effectively implement[ing] regulatory and supervisory frameworks in line with international standards”⁵¹ Additionally, the IMF points out that many of the countries experiencing de-risking manually process information they collect when onboarding new customers, which can unnerve potential business partners; however, digitizing information can mitigate this effect.⁵² This calls for the embrace of digital infrastructures.

I propose blockchain technology can be the solution to de-risking. Blockchain offers hope in mitigating this phenomenon by reducing compliance costs associated with “know your customers,” while also creating transparency in who is conducting transactions through entity identifiers.⁵³ Further, blockchain presents the opportunity for individuals and businesses alike to interact directly with major banks in peer-to-peer transactions. And while a host of other measures must be taken to reform these lost relationships, the embrace and adoption of blockchain technology is of the foremost importance.

III. WHAT IS BLOCKCHAIN TECHNOLOGY AND HOW DOES IT WORK?

A. *Distinguishing Blockchain from Bitcoin*

Blockchain is a decentralized, digital ledger that provides an immutable, irreversible record of every transaction.⁵⁴ These transactions are verified by a distributed network of global computers that participate through incentive structures.⁵⁵ First conceptualized in 1991, Bitcoin was the first application to put a distributed, public

⁵¹ *Recent Trends In Correspondent Banking Relationships—Further Considerations*, *supra* note 18.

⁵² *Id.* at 30.

⁵³ International Finance Corporation, *supra* note 4.

⁵⁴ *Id.*

⁵⁵ *Id.*

blockchain into practice.⁵⁶ A block in the blockchain is a digital recording of a transaction that typically contains information like price, action, and a timestamp.⁵⁷ Every transaction creates a block that contains a cryptographic hash of the previous block, creating a metaphoric wax seal between each consecutive block.⁵⁸ If the blockchain is public, like the one used by Bitcoin, every participant can view and verify each transaction since the blockchain's genesis.⁵⁹ Blockchains can be both private or public, or even hybrid.⁶⁰ Blockchains underpin nearly all cryptocurrencies in use today, apart from a few exceptions that this paper will not address.⁶¹

Bitcoin was created on January 9, 2009, by an unknown person or group of people acting under the pseudonym Satoshi Nakamoto.⁶² Satoshi Nakamoto published a paper, *Bitcoin: A Peer-to-Peer Electronic Cash System*, in 2008 on a cryptography mailing list website, metzdowd.com.⁶³ In 2009, Satoshi uploaded Bitcoin's software to sourceforge.com, a web-based platform where software developers upload open-source software projects.⁶⁴ On May 22, 2010, Bitcoin had its first transaction.⁶⁵ This transaction was conducted by a man named Laszlo Hanyecz who purchased two pizzas in Jacksonville, Florida, for 10,000 Bitcoins.⁶⁶ At the time of the purchase, a single Bitcoin was worth \$0.008.⁶⁷ Five days after this initial purchase by Hanyecz, Bitcoin's price skyrocket by 900% to \$0.08.⁶⁸ Recently,

⁵⁶ Luke Fortney, *Blockchain Explained*, INVESTOPEDIA, <https://www.investopedia.com/terms/b/blockchain.asp> (last visited Feb. 10, 2019).

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ Fortney, *supra* note 56.

⁶² See generally Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG, <https://bitcoin.org/bitcoin.pdf> (last visited Mar. 15, 2019).

⁶³ *Id.*

⁶⁴ *Id.*

⁶⁵ Stefan Kosterelis, *The first-ever Bitcoin transaction was used to buy two pizzas—today, it's worth \$150 million*, TECHLY (Dec. 7, 2017), <https://www.techly.com.au/2017/12/05/first-ever-bitcoin-transaction-used-buy-two-pizzas-today-worth-150-million/>.

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

as of April 1, 2019, bitcoins are worth considerably more, around \$4,140.00 per bitcoin, with regular and massive fluctuations.⁶⁹ Due to Bitcoin's meteoric rise in price, the buzz around Bitcoin and cryptocurrencies have attracted attention from both investors and the financial sector with many naysayers likening the currency's price rise to that of the Dutch tulip bubble.⁷⁰

Bitcoin is a peer-to-peer electronic cash payment system that uses blockchain technology to track and record all transactions.⁷¹ Bitcoin was created for bypassing government currency controls and simplifying transactions by dispelling the need of third-party processing intermediaries.⁷² Bitcoin works by utilizing the blockchain's network participants that agree on the validity of a transaction before the payment can be recorded.⁷³ This agreement between network users is known as "consensus protocol," which is achieved through a process known as "mining."⁷⁴ When someone initiates a transaction of sending bitcoins, miners engage in complex, resource-intense computational algorithms to verify the validity of the transaction.⁷⁵ Not only does consensus protocol verify each transaction of sent and received bitcoins, it also solves a problem unique to digital currencies—the double spending problem.⁷⁶ This double spending problem, along with the mechanics of blockchain technology, will be explained further in the next sections of this Note. In sum, blockchain can be likened to that of a road and Bitcoin to that of a car, each inherently different, but each inherently intertwined.

⁶⁹ See *Bitcoin Price (BTC)*, COINDESK, <https://www.coindesk.com/price/> (last visited Mar. 13, 2019).

⁷⁰ Andrew Beattie, *Market Crashes: The Tulip and Bubble Craze (1630s)*, INVESTOPEDIA, <https://www.investopedia.com/features/crashes/crashes2.asp> (last visited Mar. 15, 2019) (explaining the historical event where the price of tulips in Holland during the 1630s became so inflated they could purchase an entire estate, but the tulip 'bubble' burst in dramatic fashion, leaving a single tulip nearly worthless).

⁷¹ Nakamoto, *supra* note 62.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*

B. The Story of Blockchain Told Through Digital Dollars

Financial Times reporter Sally Davies describes blockchain technology when she says, “[blockchain] is to Bitcoin, what the internet is to email: A big electronic system, on top of which you can build applications.”⁷⁷ What Sally Davies means to say is that blockchain is simply infrastructure, like the roads for a car or the tracks for a train. Blockchain is a digital foundation for things to be built upon; Bitcoin and other cryptocurrencies being just one of those things. To better understand the need for blockchain technology in cryptocurrencies’ electronic cash systems, a simple illustration is required. Let us call this illustration the story of Client A and Client B.

Suppose Client A gives Client B a gold token. If this transaction takes place in the physical world, Client A simply hands over the gold token to Client B and the deal is complete. No intermediary is needed because Client B now has the gold token and Client A does not. Instead, suppose that the transaction between Client A and Client B takes place digitally. Now imagine Client A sends a digital gold token through email or Facebook messenger to Client B. The transaction is complete, right? Not exactly. For example, Client A could make copies of the digital gold token and additionally send them to Client C and Client D, creating confusion as to who truly owns the digital gold token. This is known as the double-spending problem—a problem unique to digital currencies.⁷⁸ The obvious solution to this issue is to use a ledger. The ledger would signal that Client B now owns the gold token and Client A, C, and D do not. This ledger would be stored with a trusted intermediary.⁷⁹ Let us call this intermediary Client Z. The solution to the double spending problem is completely solved. Still, however, there remains issues.

Suppose now that Client Z is persuaded by Client A to erase her digital transaction or that Client Z adds a fake transaction to the

⁷⁷ Hansel Lynn, *What Is Bitcoin and Blockchain?*, THE CODER SCH. (Oct. 3, 2017), <https://www.thecoderschool.com/blog/what-is-bitcoin-and-blockchain>.

⁷⁸ See generally Nathan Reiff, *How does block chain prevent double-spending of Bitcoins?*, INVESTOPEDIA (Oct. 22, 2018), <https://www.investopedia.com/ask/answers/061915/how-does-block-chain-prevent-double-spending-bitcoins.asp>.

⁷⁹ *What is Blockchain Technology?*, CBINSIGHTS (Sept. 11, 2018), <https://www.cbinsights.com/research/what-is-blockchain-technology/#future>.

ledger to steal the digital gold token for herself.⁸⁰ This is where blockchain's distributed network comes in handy and thus Bitcoin's solution. Client A and Client B instead decided to store the ledger with all their friends (the friends are the distributed network).⁸¹ We will call them Clients C-Y. Now, Clients C-Y all have an exact, up-to-date copy of the ledger and can each individually witness and verify every transaction between Client A and Client B.⁸² Client A can no longer lie and say she never sent the digital gold token to Client B because her ledger would not align with the rest of the distributed networks' ledgers. Both double-spending and untrustworthiness are no longer issues in this model.⁸³ A distributed network transforms a digital transaction into one like a physical transaction, where scarcity and ownership of an asset are completely known.⁸⁴

In a growing age of institutional distrust, blockchain technology is revolutionary because it eliminates the need for banks. No longer are third-party intermediaries needed to make digital transactions. Instead, people can take part in a peer-to-peer network and feel safe knowing that their digital transactions are legitimate even without knowing who the other people they are transacting with are.

C. *Blockchain as an Open-Source*

Another way of conceptualizing how blockchain technology differs from traditional digital structures is through that of a Google Document analogy. For example, suppose that Client A and Client B want to collaborate on a new project. The traditional way would be for Client A to work on a Microsoft Word Document and then send it to Client B for Client B to make changes and edits.⁸⁵ Client A, however, is locked out of this document until Client B sends it back to Client A. This type of interaction between Client A and Client B is analogous to how banks function today; they temporarily

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *What is Blockchain Technology?*, *supra* note 79.

⁸⁵ William Mougayer, *If You Understand Google Docs, You Can Understand Blockchain*, COINDESK, <https://www.coindesk.com/understand-google-docs-can-understand-blockchain/> (last updated Sept. 9, 2016).

lock access while they maintain money balances and transfers.⁸⁶ Instead, however, Client A and Client B opt for the use of a Google Document. Here, the two can jointly work on the same project simultaneously. Each participant, in real-time, can visually track each change that occurs to the document.⁸⁷ This function of Google Document is analogous to the operation of a blockchain.⁸⁸ Instead of there being a linear, locked model of interaction between Client A and Client B, otherwise known as a centralized server,



Figure 2: Traditional, centralized network.⁸⁹

blockchain utilizes a decentralized, distributed network that allows thousands of people to witness and verify every transaction on the ledger since the ledger's genesis.⁹⁰ This is visualized in the picture below.

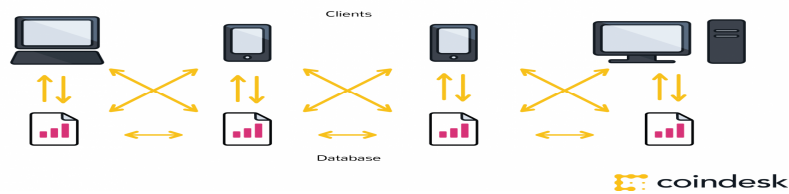


Figure 3: Decentralized, distributed network.⁹¹

D. *The Nuts and Bolts of Blockchain Technology*

A common misconception exists that blockchain technology is a new. It is not. Rather, blockchain is an amalgam of three established, existing technologies working in conjunction with one another. These three technologies are the following: 1) private key

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ Nolan Bauerle, *What is a Distributed Ledger?*, COINDESK, <https://www.coindesk.com/information/what-is-a-distributed-ledger/> (last visited Mar. 15, 2019).

⁹⁰ *Id.*

⁹¹ *Id.*

cryptography; 2) a distributed network with a shared ledger; and 3) an incentive to service the network's transactions, record-keeping, and security.⁹²

i. Private Key Cryptography

Encryption has been utilized for centuries.⁹³ Encryption is a process where information is transformed into a format that is meant to be readable only by the person or group of people allowed.⁹⁴ In the past, militaries and governments often used encryption to protect communications. Today, we use encryption communications in a variety of contexts, including Wi-Fi networks, mobile telephones, ATM machines, and secure websites.⁹⁵ Encryption makes use of an "algorithm (also called a cipher) to transform information into an unreadable format and requiring a 'key' to decrypt the data into its original, readable format."⁹⁶ A key for digitally encrypted information is simply bits and pieces of code that use a cipher to lock and unlock information.⁹⁷

Public and private keys refer to the 'keys' used to encrypt and decrypt information.⁹⁸ A public key, as its name connotes, is available to many and may be made available in an online directory.⁹⁹ A private key is restricted to the originator of the encrypted content and a limited audience with whom it is shared.¹⁰⁰ Private key encryption is a form of encryption where only a single private key can decrypt information—this is the fastest type of encryption because only one key is needed to unlock the information.¹⁰¹ For example, if Client A wants to send sensitive data to Client B and wants to be sure that only Client B may be able to read it, she will encrypt the

⁹² Nolan Bauerle, *How Does Blockchain Technology Work?*, COINDESK, <https://www.coindesk.com/information/how-does-blockchain-technology-work/> (last visited Mar. 15, 2019).

⁹³ Francis Knott, *What is Private Key Encryption?*, KOOLSPAN, <https://koolspan.com/private-key-encryption/> (last visited Mar. 15, 2019).

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ *Id.*

⁹⁷ Knott, *supra* note 93.

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

data with Client B's Public Key. Only Client B has access to her corresponding Private Key and, as a result, is the only person with the capability of decrypting the encrypted data back into its original form.

Figure 4: Private key encryption.¹⁰²



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But strong control of ownership is not enough to secure digital relationships. While authentication is solved, it must be combined with a means of approving transactions and permissions (i.e. authorization). For blockchains, this begins with a distributed network.

ii. A Distributed Network with A Shared Ledger

The second piece of technology that blockchains utilize is a distributed, shared ledger. Since ancient times, ledgers have been an integral part of the economy, recording information such as payments, contracts, and the ownership of assets.¹⁰³ These were commonly executed on stone or clay tablets or even papyrus paper.¹⁰⁴ With the dawn of computers, however, ledgers have transformed from tangible objects into intangible digital information scattered around the globe.¹⁰⁵ Blockchain technology, like previously mentioned, utilizes a distributed network where a ledger is shared on hundreds or even thousands of computers simultaneously. Instead of just one central authority verifying a transaction, each computer within the network comes to its own conclusion in order to verify the transaction. Once each computer concludes, a vote occurs and the conclusion that the majority of computers reach becomes the official transaction.¹⁰⁶ This is known as consensus protocol, which is discussed in more detail below.

¹⁰² *How Does Blockchain Technology Work?*, *supra* note 92.

¹⁰³ *What Is A Distributed Ledger?*, *supra* note 89.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

So, when private key cryptography and a distributed network work together in conjunction, the sum is a useful way of announcing to the world that a transaction took place. For example, Client A would take their private key and attach it to Client B's public key, and when these keys attached, a broadcast is sent out to every computer in the network.¹⁰⁷ In the case of cryptocurrencies, this broadcast would signal the amount of cryptocurrency being sent.¹⁰⁸ This broadcast is referred to as a block. Investopedia breaks down a block further when it says,

A block is the 'current' part of a blockchain, which records some or all of the recent transactions. Once completed, a block goes into the blockchain as a permanent database. Each time a block gets completed, a new one is generated. There is a countless number of such blocks in the blockchain, connected to each other (like links in a chain) in proper linear, chronological order. Every block contains a hash of the previous block. The blockchain has complete information about different user addresses and their balances right from the genesis block to the most recently completed block.¹⁰⁹

iii. An Incentive to Service the Network's Transactions

The last piece of technology that is used in conjunction with private key cryptography and a distributed network is an incentive to service the network's transactions. This piece of technology answers the question of why people would join the blockchain to verify the transactions of others. The answer is simple: self-interest. When a block is created, or when Client A and Client B match their digital keys with one another, this block must be verified by the distributed network before it can enter the blockchain.¹¹⁰ For the block to be verified, computers use software written specifically for mining

¹⁰⁷ *What Is A Distributed Ledger?*, *supra* note 89.

¹⁰⁸ *Id.*

¹⁰⁹ Fortney, *supra* note 56.

¹¹⁰ Noelle Acheson, *How Bitcoin Mining Works*, COINDESK, <https://www.coindesk.com/information/how-bitcoin-mining-works/> (last updated Jan. 29, 2018).

blocks to solve a puzzle, which turns the block into something known as a hash.¹¹¹ A hash is a simplified version of the block or a seemingly random sequence of numbers and letters signifying the contents of the block.¹¹² A hash also contains information from the previous block's hash.¹¹³ By having a portion of the previous block's hash in the new hash, this creates a metaphoric wax seal.¹¹⁴ This wax seal confirms that the current block, along with every block created after it, is legitimate.¹¹⁵ If someone tries to create a fake transaction by changing a block, even with a minuscule change, the fraudulent hash would completely alter and thus not fit into the blockchain because each hash has a portion of the previous block within it.¹¹⁶ This unique property of blockchains may prevent fraudulent activity because legitimate work is accepted as a block, while illegitimate work is rejected and easily identifiable.

In the case of Bitcoin and most cryptocurrencies, however, solving these puzzles to create a hash is intentionally made difficult. The reason for this intentional difficulty is to disincentivize "bad actors" from participating in the distributed network. This is where the security aspect of servicing the network comes into play. For a cryptocurrency transaction on the blockchain to be verified, cryptocurrencies require something known as proof-of-work to occur before a cryptocurrency miner can turn a block into a hash that joins the blockchain. Proof-of-work is a system that requires a "not-insignificant but feasible amount of effort" to turn a block into a hash. Simply put, proof-of-work is a system that requires a target level of work to be performed for a block to be turned into a hash. To reach this target level, enormous amounts of computing power are needed, which requires enormous amounts of money. By making it very expensive to process transactions, this deters people who are not interested in servicing the network, making blockchains and their transactions more secure as the only people in the network are true cryptocurrency miners.

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ Acheson, *supra* note 110.

¹¹⁶ *Id.*

Ultimately, whomever solves the puzzle and turns the block into a hash is then rewarded with twenty-five bitcoins.¹¹⁷ Currently, the price of one bitcoin is approximately \$4,000.¹¹⁸ So, an average haul for verifying a transaction can roughly equate to \$100,000. This is where the phrase ‘Bitcoin Mining’ comes from—how gold miners expend energy and resources in discovering gold, bitcoin miners spend resources to discover bitcoins.¹¹⁹ Once the puzzle is solved, the blockchain is updated and everyone is informed of the transaction.¹²⁰ The incentive structure is that you must solve puzzles which verify other people’s transaction and then you are rewarded in bitcoins.

Combining these three technologies of private key cryptography, a disturbed network, and an incentive to service the network’s transactions, blockchain technology supplants traditional, centralized ledgers by creating an immutable, incorruptible record of transactions that are verified by a system of global computers. The potential for blockchain technology is not confined to just digital currency transactions, however; blockchain has a variety of applications that can transform industries across the board.

IV. BLOCKCHAIN AS A SOLUTION TO DE-RISKING

Blockchain technology can help mitigate de-risking in Latin America and the Caribbean by cutting compliance and regulatory costs while making transactions more transparent.¹²¹ Additionally, blockchain-based networks can circumnavigate traditional banking bureaucracies by cutting out the need of correspondent banks and allowing citizens to interact directly with senders and receivers, reducing transaction costs and increasing efficiency.¹²²

A. Consolidation and Cost Cutting

To start, blockchains can consolidate. As mentioned earlier in this Note, the blockchain can store nearly any type of data on its de-

¹¹⁷ *Id.*

¹¹⁸ *Bitcoin Price (BTC)*, *supra* note 69.

¹¹⁹ Acheson, *supra* note 110.

¹²⁰ *Id.*

¹²¹ Williams, *supra* note 1, at 6.

¹²² *Id.*

centralized network.¹²³ This storage on blockchains can include currency amounts, land deeds, contracts, death/birth certificates, etc.¹²⁴ Currently, banking is a paper-based process hidden behind a veil of digital technology.¹²⁵ Banking remains a system of fragmented, separate databases that require constant manual attention and maintenance, which is inundated by arduous, paper-intensive processes.¹²⁶ For instance, in a payment transaction, ledger entries must be passed by the ordering banks to the intermediary bank, then by the intermediary to the central clearing house and, finally, from the central clearing house to the beneficiary bank—all of which occurs in a tedious and time consuming manner.¹²⁷ Blockchain can reduce regulatory compliance at the outset by consolidating all information in one decentralized location.¹²⁸ This cuts costs by reducing oversight labor and reconciliation costs, ultimately improving data quality.¹²⁹

Next, blockchains can reduce regulatory costs by reducing redundant Know Your Customer processes (“KYC”).¹³⁰ Currently, banks and financial institutions are required to comply with extensive KYC processes, which require banks to validate and verify primary documents as part of the due-diligence protocol.¹³¹ This process is both expensive and time consuming: a recent report by

¹²³ *Id.*

¹²⁴ Don Tapscoot, *Blockchain: the ledger that will record everything of value to humankind*, WORLD ECON. FORUM (Jul. 5, 2017), <https://www.weforum.org/agenda/2017/07/blockchain-the-ledger-that-will-record-everything-of-value/>.

¹²⁵ Kristio Magowan, *Technology Eliminating Paper-based Contracts in Banking*, IT CHRONICLES, <https://www.itchronicles.com/news/technology-eliminating-paper-based-contracts-banking/> (last visited Feb. 18, 2019).

¹²⁶ Sean K. Conway, *Blockchain Technology Could Reduce Investment Banks' Infrastructure Cost By 30 Percent, According to Accenture Report*, ACCENTURE (Jan. 17, 2017), <https://newsroom.accenture.com/news/blockchain-technology-could-reduce-investment-banks-infrastructure-costs-by-30-percent-according-to-accenture-report.htm>.

¹²⁷ Binu Yohannan, *Blockchain—A Blessing For KYC & AML?*, INTELLECT, <https://www.intellectdesign.com/insight/blockchain-a-blessing-for-kyc-aml.html> (last visited Feb. 18, 2019).

¹²⁸ Sloane Brakeville & Bhargav Perepa, *Blockchain basics: Introduction to distributed ledgers*, IBM (Mar. 18, 2018), <https://www.ibm.com/developerworks/cloud/library/cl-blockchain-basics-intro-bluemix-trs/index.html>.

¹²⁹ *Id.*

¹³⁰ Yohannan, *supra* note 127.

¹³¹ *Id.*

Thomas Reuters found that some businesses are spending more than \$500 million dollars a year on KYC compliance.¹³² And while a litany of tools exists to help banks in meeting these due-diligence requirements, regulations and an urgency to maintain one's reputation make these processes laborious.¹³³ In some instances, for example, satisfactorily meeting a KYC protocol can delay business between thirty and fifty days due to the extensive nature of an investigation.¹³⁴ Moreover, each bank and financial institution is responsible for its own due-diligence and investigation before a client is onboarded or verified.¹³⁵ This creates redundant KYC investigations between different banks and financial institutions. For example, if Client A decides to open a bank account with Bank of America ("BOA"), BOA is responsible for all due-diligence measures relating to Client A. If Client A then decides to open an account with JP Morgan Chase ("JPMC"), JPMC will then have to conduct these exact same due-diligence measures. This redundant nature in KYC compliance is a poor allocation of resources and detracts from efficient banking. Blockchains can solve this redundancy rather simply.

Because blockchain is a distributed ledger that houses immutable, permanent records, blockchain can serve as a "golden source of data" by allowing banking institutions access to previously created KYC reports.¹³⁶ For example, a blockchain-based registry could remove the duplication of KYC efforts by providing banks with previously recorded details like the source of funds, businesses interest, and history of the client's transactions, while simultaneously allowing a real-time monitoring of the transaction.¹³⁷ Further, a distributed ledger would enable the banking community to simultaneously receive encrypted updates regarding client details.¹³⁸ A shared KYC ledger could also provide indelible records of all documents and compliance activities, satisfying regulators' compliance

¹³² Mark D. Harrop & Brian Mairs, *Thomas Reuters 2016 Know Your Customer Surveys Reveal Escalating Costs and Complexity*, THOMSON REUTERS (May 9, 2016), <https://www.thomsonreuters.com/en/press-releases/2016/may/thomson-reuters-2016-know-your-customer-surveys.html>.

¹³³ Yohannan, *supra* note 127.

¹³⁴ *Id.*

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ Yohannan, *supra* note 127.

measures.¹³⁹ This is the first way that blockchain technology can help banks reform relationships with correspondent banks—cutting compliance costs.

B. Catching the Bad Guys with Transparency

Blockchain technology is also making transactions more transparent, directly tackling anti-money laundering and other illegal activities.¹⁴⁰ Before this can be explained, however, a quick primer is needed to explain how fraud protection occurs today. In the United States, the Bank Secrecy Act requires all financial institutions “to monitor their customers, report suspicious transactions, and maintain customer records that can be audited by the government.”¹⁴¹ Currently, illegal activity is detected through patterns in banking activity.¹⁴² For example, a traditional ledger utilized by banks stores data regarding transactions, assets, liabilities, expenses, and capital for each individual and business, which ultimately allows banks to compile it and create a picture or mosaic of the lives of their clients based on spending habits.¹⁴³

Banks monitor these patterns and report activity that seems irregular or odd based on prior expenditure patterns.¹⁴⁴ Once an irregularity is noticed or a suspicious transaction detected, a required report is sent to federal law enforcement officials.¹⁴⁵ From here, the officials cross-reference this information with other accounts and investigate further if needed.¹⁴⁶ Unfortunately, this technique is hampered due to siloed information between different institutions, making it difficult for task-forces to track illegal activity in real-time.¹⁴⁷ This occurs because information that looks normal from one institution may look entirely suspicious to another; this takes longer for

¹³⁹ *Id.*

¹⁴⁰ Kristofer Readling & Justin Schardin, *Why Blockchain Could Bolster Anti-Money Laundering Efforts*, BIPARTISAN POLICY CTR. (June 2, 2016), <https://bipartisanpolicy.org/blog/blockchain-anti-money-laundering/>.

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

¹⁴⁷ *Id.*

officials to connect the dots between transactions.¹⁴⁸ To help illuminate this inadequacy in traditional banking for spotting and stopping crime, use the simple example below.

Suppose, Client A gets in trouble with her mom. Her mom decides that she is grounded and has lost all privileges. Client A, however, is smart and knows her dad does not know this information yet. Client A leverages this asymmetric information by asking her dad if she can go to her friend's house to play. Of course, her dad says yes and lets her go because he does not have the information from the mother that she is grounded yet.¹⁴⁹ This analogy is simple, but strong in the context of stopping crime. Because banks typically only check their own systems, they often miss illegal activities by their clients that are occurring right in front of them.¹⁵⁰ The ramifications for these missed crimes are tremendous. Look no further than the San Bernardino shooting.¹⁵¹ There, the perpetrators, before committing the heinous shooting, drained their bank accounts and maxed out their credit cards.¹⁵² This activity is hard to quickly spot because bank accounts, credit cards, and loan information are often dispersed.¹⁵³ Blockchain technology can dramatically improve the rate of speed and effectiveness that law enforcement uncovers these illegalities through its distributed ledger.

Using a distributed ledger, banks could consolidate data across all realms of finance into one, decentralized location, allowing the mosaic of a businesses and people to be viewed easier.¹⁵⁴ Asymmetric information would no longer exist as law enforcement officials would gain access to the entire system's ledger rather than just the suspicious activity reports currently submitted by individual institutions.¹⁵⁵ To draw on the example above, it would be as if Client A's dad was notified immediately that his daughter was in trouble and had lost all privileges, ultimately stopping her before she could leverage asymmetric information against him to play with her friends.

¹⁴⁸ *Id.*

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

As mentioned earlier in this Note, the notification to Client A's dad would be immediate because blockchain technology relies on a distributed network of computers that each house an up-to-date record of pertinent information.¹⁵⁶ Third-party intermediaries are not needed to facilitate transactions, but instead, information is accessed peer-to-peer, making the access to transactions transparent and cost-effective.¹⁵⁷ It should be noted, however, that privacy concerns must be balanced against total transparency.¹⁵⁸ And again, as mentioned earlier in this Note, a lot of these privacy concerns can be mitigated through encryption. Still, additional infrastructures are needed to support blockchains, like protocols for when financial regulators and law enforcement officials can gain access to encrypted keys to access an individual's financial history.

The ultimate effect of this transparency for large banks is less unknowns. Being able to spot and stop crime in real-time is enormous for banks when deciding whether to do business with correspondent banks in other countries. The reason why is because regulatory expectations are often unclear, inconsistently communicated, and unevenly implanted by examiners,¹⁵⁹ leaving banks in precarious situations when evaluating potential risk and compliance. Being able to stop crime, however, reduces unknowns for large, global banks, increasing the incentive for these banks to engage in relationships with smaller correspondent banks.

C. Best Case Scenario: The Leap Frog

International money transfers utilize a vast network of interconnected banks and financial institutions to complete transactions, each taking a small 'piece of the pie' as they hand off money from one institution to the next.¹⁶⁰ These multilayered transactions are insufficient and expensive for consumers. For example, major banks

¹⁵⁶ *What Is A Distributed Ledger?*, *supra* note 89.

¹⁵⁷ *Id.*

¹⁵⁸ Readling & Schardin, *supra* note 140.

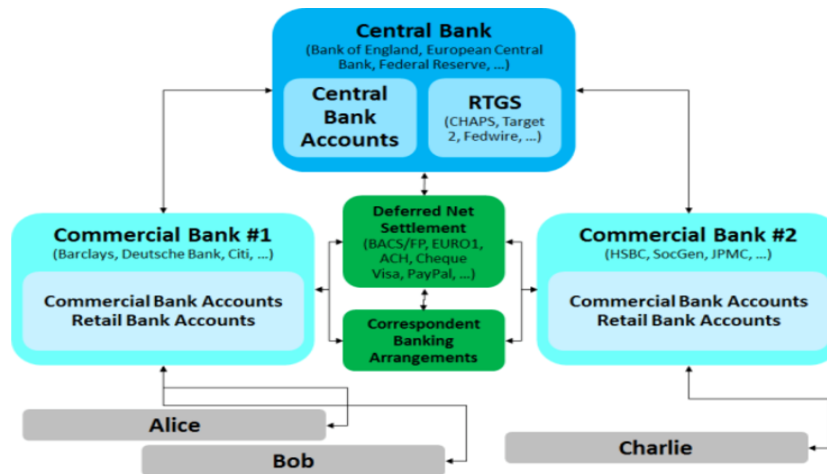
¹⁵⁹ *Recent Trends In Correspondent Banking Relationships—Further Considerations*, *supra* note 18.

¹⁶⁰ Ben Schiller, *The Fight For the \$400 Billion Business Of Immigrants Sending Money Home*, FAST CO. (Apr. 28, 2017), <https://www.fastcompany.com/3067778/the-blockchain-is-going-to-save-immigrants-millions-in-remittance-fees>.

charge an average of 13% of the total amount for sending monies between countries with post-offices and money-transfer operators charging 9% and 7%, respectively.¹⁶¹ The image below depicts the maze a wire transfer must traverse to be completed.

Figure 5: Correspondent banking¹⁶²

For the millions of citizens in Latin America and the Caribbean who rely on these institutions for receiving money from family members abroad, these funds are crucial to daily life and need to be preserved.¹⁶³ Blockchains and cryptocurrencies can solve this problem by eliminating the need for correspondent banks all together.¹⁶⁴ And while this is still some ways off in terms of becoming a common method for sending and receiving money internationally, some companies are already proving it may be the most viable method



after all.¹⁶⁵

Abra, a cryptocurrency exchange, claims it can reduce remittance costs by up to 90%.¹⁶⁶ Abra works by having a user download a mobile app and then load money into Abra's mobile phone wallet.¹⁶⁷ Then, the user finds their corresponding recipient using

¹⁶¹ *Transfer Fees*, THE ECONOMIST (Dec. 15, 2010), <https://www.economist.com/blogs/dailychart/2010/12/remittances>.

¹⁶² *Id.*

¹⁶³ Radcliffe, *supra* note 33.

¹⁶⁴ International Finance Corporation, *supra* note 4.

¹⁶⁵ Schiller, *supra* note 160.

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

Abra's directory, chooses the amount of money they want sent, and then presses send.¹⁶⁸ While the experience of the app is like Venmo,¹⁶⁹ it functions much differently.¹⁷⁰ Abra, instead, converts the original currency into bitcoin and then transfers it across the digital currency's blockchain, where it settles in the local currency—customers do not realize they have undergone a bitcoin transaction.¹⁷¹ Talie Baker, a senior analyst at Alite Group Banking & Payments, believes this may be the future of remittance exchange, saying “[a]s blockchain technology matures, it has true disruptive potential to bring the cost of remittances to nearly zero and facilitate instant secure payments anywhere in the world.”¹⁷² The future of this practice remains unknown, however, as “[b]itcoin is still an experimental currency in active development, and nobody can predict its staying power. It is not an official currency, and some jurisdictions even consider it illegal.”¹⁷³ Only once cryptocurrencies become mainstream for sending and receiving money will this technology be able to leapfrog correspondent banks all together. But in the meantime, it is best to focus on blockchain's ability to restore correspondent banking relationships with large, global banks.

V. CONCLUSION

Money laundering, terrorism financing, and tax-evasion—three things that should no longer be synonymous with Latin American and Caribbean banking. Unfortunately, however, these issues remain, as global banks continue to sever ties from small regional banks in these areas due to exorbitant compliance costs associated with due-diligence and lack of transparency. The effects of de-risking spells trouble for these regions because, without correspondent banks, foreign partnerships will continue to dry up, leading to lost

¹⁶⁸ *Id.*

¹⁶⁹ Caren Weiner Campbell, *What is Venmo?*, NERDWALLET (Nov. 6, 2018), <https://www.nerdwallet.com/blog/banking/what-is-venmo/> (explaining that Venmo is a mobile payment service owned by PayPal that allows users to transfer money to one another (within the U.S. only) using a mobile phone app or web interface).

¹⁷⁰ Schiller, *supra* note 160.

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ *Id.*

revenues, weaker banking sectors, and less FDI. Thanks to Blockchain technology's decentralized, immutable digital ledger, this technology can remedy this situation by re-incentivizing global banks to reform lost relationships through consolidating information, eliminating redundant KYC reports, memorializing transactions, and increasing transparency for crime spotting. Blockchains are also providing opportunities for citizens and businesses to engage in peer-to-peer transactions with global markets, leap-frogging correspondent banks entirely through the process of sending and receiving remittances via cryptocurrencies—although this remains a distant solution for the time being. And while it is acknowledged that additional infrastructures would need to be put in place to assist successful blockchain implementation, this technology should at least be given a chance to showcase its potential. Without doing so, Latin America and the Caribbean may be left without anything to bank on.