INTERNATIONAL REMITTANCES AND BLOCKCHAIN TECHNOLOGY

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ABSTRACT

Remittances are an important component of the economic livelihood of migrants and their families. Recently, blockchain-based attempts to improve remittances have garnered a great deal of attention. Specifically, proponents believe blockchain is uniquely suited to overhauling and streamlining the decades old correspondent banking system, the “pipes” through which most international money flows through. However, on closer investigation, the picture is much more complicated. Firstly, while being careful to generalize given the heterogeneity of remittance corridors, the literature challenges the commonly cited view amongst blockchain proponents that remittance markets are dysfunctional and costs are exorbitantly high. Secondly, it appears that blockchain initiatives in the cross-border payment space only address two of the four key cost drivers in the remittance business: the inefficient correspondent banking system and lack of market competition in certain corridors. But blockchain does not address other cost drivers such as regulation and agent network infrastructure. Thirdly, the two models of blockchain startups impacting the remittance space are still in the early stages of development, with mixed evidence on their success. These nascent efforts in the cross-border payments space have also revealed the difficulty of realizing blockchain’s myriad benefits in a theoretical sense – security, speed, de-centralization, lower costs – when the technology is put into a real world operating environment.

Keywords: Remittances, Blockchain, Bitcoin, Migrants, Correspondent Banking, Cross Border Transfers, Migrants, Moneygram, Ripple, Western Union

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1. Executive Summary

In recent years, blockchain-based attempts to improve cross border money transfers have garnered a great deal of attention. Within the cross-border money transfer space, the enthusiasm to apply blockchain has been particularly high for remittances - the niche segment of cross border flows that migrants make back to their families in their home countries. This enthusiasm is in part due to the significant size of the remittance market - by some estimates over $400 billion.\textsuperscript{1} The enthusiasm is also due to the potential to improve the economic livelihood of migrants by reducing remittance costs, which, according to the World Bank, globally average 7.7%.\textsuperscript{2}

Blockchain proponents tend to suggest blockchain technology in cross border payments can lead to a reduction in costs for remittance markets. Specifically, proponents believe blockchain is uniquely suited to overhauling and streamlining the decades old correspondent banking system, the “pipes” through which most cross border money flows through. However, on closer investigation, the picture that arises is much more complicated.

Firstly, while being careful to generalize given the heterogeneity of remittance corridors, the literature challenges the commonly cited view amongst blockchain proponents that remittance markets are dysfunctional and costs are exorbitantly high. One remittance client survey suggests that many remittance clients are satisfied with the service of existing providers, and may be willing to accept normatively higher prices in exchange for other benefits including convenience and the ability to transact in cash.\textsuperscript{3} Other studies note that in some large volume country-to-country corridors, remittances exhibit characteristics of market efficiency and low and declining costs over time, spurred on by competition (although inconclusive, smaller country to country corridors tend

\textsuperscript{2} Ibid.
to be where more volatility in pricing occurs).  

Secondly, it appears that blockchain initiatives in the cross-border payment space only address two of the four key cost drivers in the remittance business: the inefficient correspondent banking system and lack of market competition in certain corridors. But blockchain does not address other key cost drivers such as regulation and agent network infrastructure. Thus, its overall impact on remittance costs may be overstated relative to mainstream press reports.

Thirdly, the two dominant models of blockchain startups impacting the remittance space are still in the early stages of development, with mixed evidence on their cost benefits. The first model consists of consumer-focused start-ups leveraging the bitcoin blockchain for the transfer of payments across borders. So far, the cost savings of this model (potentially faster settlement of funds by leveraging bitcoin), are counter-balanced by challenges that arise in implementation. Some implementation challenges are unique to the blockchain-aspects of their business model: high bitcoin network transaction fees, foreign exchange costs and volatility, corridors with limited liquidity for fiat-bitcoin pairs, and difficulty finding and maintaining their banking relationships. Other challenges are simply related to being a new player in the remittance market: the difficulty of acquiring digitally unsophisticated customers without a bricks and mortar agent network, and the high cost of compliance without operating a remittance business at scale. Recently, many of these bitcoin remittance startups have migrated away from their early focus on small dollar remittances to the more digitally savvy (and relatively larger per ticket size) small business clients. Others have abandoned the international money transfer service completely.

The second model in the blockchain sphere with implications for the remittance space is at the infrastructure and protocol layers. Specifically, a handful of start-ups are attempting to create

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5 Interview, Minsi Wang, BitPesa
an alternative to SWIFT, the predominant back-end enterprise software and messaging system that powers the correspondent banking system. Startups such as Ripple and Stellar do not aim to replace or make irrelevant the many intermediary banks involved in correspondent banking. On the contrary, they are attempting to convert as many of the 8,000 member banks of SWIFT to their new blockchain-based software solutions, which claim to provide more seamless and integrated communication when transferring funds from one country to another. Where bitcoin-based remittance start-ups can quickly deploy a consumer-facing business in a specific country-to-country corridor, these blockchain infrastructure alternatives to SWIFT are much more ambitious in scope and global in scale. It requires bringing together disparate actors across the remittance eco system, not to mention overcoming concerns over replacing a tried and tested technological solution with a new solution in the risk averse banking sector. Furthermore, while these startups may lead to increased efficiency in the market, it may go against the incentives of many incumbent correspondent banks, who are beneficiaries of some of the inefficiencies of the current market structure. At the same time, SWIFT has also made strong efforts not only at upgrading its existing protocols, but also has cautiously explore potential applications of blockchain as well. So far, only a small portion of banks are adopting these new solutions, and without giving up their links to SWIFT.6

2. Introduction

2.1. International Remittances and the Potential of Blockchain Technology

In 2015, approximately 250 million people lived outside the countries of their birth.7 The monetary transfers that these migrants make back to their home countries – what are labeled

international remittances – can make an important contribution to the economic livelihood of these migrant families.

Remittances take place between developed countries (North-North), between developing countries (South-South), and from developed countries to developing countries (North-South). In the international development community, the definition is narrower: small value money transfers by lower income migrants back to their families in the developing world. For this paper, the focus is on remittances of a monetary nature, with an emphasis on the definition used in an international development and public policy context.

The scale and significance of remittances can be captured by several statistics. In 2015, the flow of remittances back to developing countries was estimated to be over US$441 billion.\(^8\) Moreover, this number equals three times the volume of official aid flows, and constitute 10% of the GDP in 25 developing countries.\(^9\)

A strong association exists between remittances and poverty reduction; Aside from directly augmenting household income, studies show that remittances may improve health, education, and economic outcomes in recipient communities in regions such as Africa, amongst others.\(^10\) It then follows that enhancing the effectiveness of the remittance market – reducing costs, increasing access, and improving service – may not only enable a more efficient market, but also advance the international development agenda.

Blockchain, which emerged in 2009 as the underlying technology of the crypto-currency bitcoin, is viewed as a technology that can improve (and some claim revolutionize) the global payments infrastructure that remittances rely upon. This infrastructure – which is sometime also

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\(^9\) Ibid.
referred to as the correspondent banking system - dates back to the 1970s and relies on multiple “middleman” banks to move funds before reaching the ultimate end client. Blockchain proponents claim that this system results in time delays, opacity, and errors in reconciliation. Ultimately, this results in higher prices for end clients. A commonly cited statistic is that migrants globally pay on average 7.7% in fees on the principal balance of a remittance.11 Adopting new technologies such as blockchain, they contend, could reduce remittance costs to 5%, saving migrants around $14 billion per year.12

Proponents view blockchain as the next generation in payments infrastructure. Conceptually, the blockchain can be utilized as a system for managing records that is maintained by a de-centralized network of computers which record and verify every transaction. Transactions are added chronologically to the blockchain ledger and cannot be revised retro-actively, creating an immutable audit trail. Unlike the centralized client-server model that underlies the majority of IT architecture, in principle, the blockchain’s design and features - when applied to the transfer of money globally - could yield benefits in terms of transparency, security, speed, and data integrity.

For this reason, blockchain-based payment initiatives have multiplied in recent years. Financial institutions, central banks, and development institutions, are engaging in blockchain research and proof of concepts. VC-backed start-ups are using bitcoin to move money across borders, providing competition to incumbent players such as Western Union and Moneygram. At the infrastructure level, several notable start-ups are developing blockchain alternatives to the established correspondent banking messaging protocol, SWIFT. At the same time, incumbents are also looking closer at blockchain and responding with their own initiatives.13

12 Ibid.
Making sense of the publicity and exuberance surrounding blockchain and remittances can be challenging. Can blockchain as a technology address the issues that matter in the remittance market? To what extent are startups in the remittance space using blockchain simply as a method to raise capital from investors, or as a core part of their competitive advantage? It requires an understanding of two unrelated domains of knowledge: blockchain technology and the global payment system. Commentators from multiple backgrounds, including technologists, development researchers, and financial services practitioners, view blockchain’s impact on remittances with varying degrees of skepticism (or enthusiasm). In contrast, blockchain advocates view remittances as one of the most promising use cases for this new technology.

The main goal of this research is to more rigorously examine the question of whether blockchain can be a relevant solution to reducing costs in the remittance market. This research also aims to contribute to an existing gap in the literature by attempting to comprehensively classify the various blockchain-related remittance initiatives underway, the strengths and weaknesses of each approach vis-à-vis the remittance markets, and provide some initial conclusions and predictions on how events could unfold.

2.2. Research Approach

Section 2 summarizes the existing literature in three areas: Remittances and Development, Challenges in the Remittances Market, and Blockchain and the Global Payments System. In regard to Challenges in the Remittances Market, while the literature review will briefly touch upon the discrepancy in opinions between development academics and remittance practitioners regarding whether costs are truly excessive, this paper assumes that a further reduction in costs is generally a desirable outcome.
Section 3 provides an overview of the current state of the remittance market, a description of key steps in the remittance process, examples of key remittance business models, and a classification of remittance cost drivers. Classifying key remittance cost drivers is a key foundation to understanding blockchain’s potential relevancy to the remittance market.

Section 4 provides a non-technical introduction to the history and key characteristics of blockchain. Importantly, the paper will touch upon the distinction between blockchain’s benefits and drawbacks in a theoretical sense, versus those benefits and drawbacks in a real world operating environment. The section ends with an analysis of the two relevant blockchain business models impacting the remittance market, and assess how they impact each of the remittance cost drivers described in Section 3.

Section 5 will present the main conclusions, and provide some opinions on which blockchain-based remittance business models have the highest potential for impact and/or adoption.

This research draws upon academic literature, media coverage, market reports, policy data, and qualitative feedback from interviews with relevant stakeholders.

3. Literature Review

3.1. Literature on Remittances and Development

Academic studies have highlighted the positive association between remittance flows and poverty alleviation. One World Bank cross-country analysis shows on average a 10 percent increase in the share of international remittances in a country’s GDP will lead to a 1.6 percent decline in the share of people living in poverty.14 A IMF study focusing on remittances flows to Sub Saharan Africa finds that remittances lead to statistically significant increases in per capita

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income and reduction in income equality.\textsuperscript{15}

Remittances may also serve as a financial lifeline in time of crisis. This is because they tend to be more stable than other types of capital flows and may even be countercyclical – continuing to flow during times of economic uncertainty or natural disaster. The World Bank estimates that remittances accounted for 12\% of the GDP of Haiti during the 2011 earthquake, and up to 70\% of GDP in some areas of Somalia during the 2006 civil war.\textsuperscript{16}

Financial sector broadening is also cited as another positive by-product of remittances. When remittances are carried out through the rails of the formal banking system, remittances can serve as a gateway to the formal banking system (and other utility-enhancing financial products) for underserved banking clients.

The link between remittances and economic growth is less conclusive. Studies have acknowledged that migration - the root cause of remittances – can leave negative economic impacts on developing countries in the form of labor shortages and outflows of skilled human capital.\textsuperscript{17} Undeniably, increasing migration to increase remittances is not a public policy goal. But if one accepts that migration is inevitable, remittances may act as a counter-balancing salve on the negative impact of the brain drain, by safeguarding flows of funds back to countries experiencing net outflows due to migration.

Remittances themselves are also sometimes correlated with lower growth rates, with some concluding that remittances could be a dis-incentive to work.\textsuperscript{18} Yet this phenomenon may simply reflect the countercyclical nature of remittances – namely, that they increase in worse economic times. Use of funds may also come into play. A study in El Salvador suggests remittances, when

\textsuperscript{17} World Bank. Impact of Migration on Economic and Social Development: A Review of Evidence and Emerging Issues. 2010.
\textsuperscript{18} Ibid.
utilized for consumption purposes in recipient communities, may lead to a decline in savings and decrease in economic activity.\textsuperscript{19} Yet another study in Mexico finds that remittances make up 20 percent of the capital in micro businesses, and even higher for female owned businesses.\textsuperscript{20} In an ideal situation, poorer household use remittances to finance basic consumption goods for productive purposes, whether it be for children’s education, health, or food. For wealthier household, remittances can be channeled to business and entrepreneurial activities.

3.2. Literature on Costs in the Remittance Market

Studies from research arms of international development institutions have analyzed current problems in the remittance market. By far, the most commonly cited area of concern – and the focus of this thesis - is related to costs for the users of remittances.

The World Bank notes that remittance costs in the second quarter of 2017 hovered around 7.3\%, above the 3\% target set in the Sustainable Development Goals.\textsuperscript{21} Aside from the normative assertion on the costliness of remittance, the development literature also describes the huge variation in costs by remittance corridor (Section 4 presents more detailed data on corridor-by-corridor cost variation). Broadly speaking, large dollar size money transfers (corporate transfers, for example) tend to be characterized by more efficient markets and lower pricing. Remittances, on the other hand, as a sub sect of cross border flows, are characterized by higher prices to compensate for the higher cost for servicing such small transactions.

Academic studies have also explored how remittance flows are sensitive to costs, and will likely increase in volume as costs decline.\textsuperscript{22} One randomized control study carried out with the


support of a remittance service provider was conducted among migrants from El Salvador in the Washington D.C. area.\textsuperscript{23} It found that a $1 reduction in fees led migrants to send $25 more in remittances per month via remittance providers. The increase in remittance occurred due to increased frequency of transactions rather than larger amounts of funds sent per transaction. Another study found that the volume of remittances negatively correlate with transaction cost levels and exchange rate pricing volatility.\textsuperscript{24} The authors further suggest that higher transaction costs may cause migrants to refrain from sending money or use informal channels.\textsuperscript{25}

While much of the inquiry into improving the remittance market accepts cost as the key market challenge, the situation on the ground may not be as bleak as publicized. A June 2017 World Bank analysis of global remittance prices, for example, revealed that from 2008 to the second quarter 2017, the global average cost of sending a $200 remittance has been steadily decreasing from approximately 10\% to 7.5\%.\textsuperscript{26} A 2016 survey by the Inter America Dialogue focusing on Latin American migrants in the United States shows that 75\% of those surveyed were satisfied or very satisfied with their remittance service providers, and over 85\% found these same providers customer oriented.\textsuperscript{27} The same survey finds that over 70\% of clients agree or strongly agree that their remittance providers are transparent on pricing and exchange rates, and 60\% view remittances as inexpensive (15\% disagreed with the characterization that remittances were expensive). While the development (and blockchain) community may continue to focus on costs, these data points suggest that remittance costs are declining globally, and the end clients themselves (in at least one high volume corridor) are satisfied with the pricing and services of


\textsuperscript{25} Ibid.


remittances providers.

Importantly, there is less empirical research on the key cost drivers of remittances, although various studies seem to pinpoint several key factors: lack of competition, the complexity of global payments infrastructure, and regulatory issues.\textsuperscript{28} In regards to the latter factor, a number of research studies have highlighted the role of the de-risking phenomenon – the withdrawal of global banks from correspondent banking relationships in certain remittance corridors – as a key bottleneck to access.

One of the few empirical studies finds the importance of increasing competition in lowering costs in high cost corridors.\textsuperscript{29} Specifically, it finds that, “the cost of remittances across all types of remittance service providers show that corridors with a larger number of migrants and more competition exhibit consistently lower costs.”\textsuperscript{30} The study found that remittance costs also tend to be higher in corridors with higher share of bank providers (versus specialist money transfer operators such as Western Union), and in countries with higher levels of income.

Interestingly, in the case of market leader Western Union, cost was insensitive to competition, which may reflect Western Union’s market power.\textsuperscript{31} Market power becomes a salient point given that the multitude of challenger blockchain initiatives are small start-ups. Corroborating this view, a 2013 study by the Consultative Group for Assisting the Poor on new digital remittance models (not limited to blockchain models), found that the initial “set-up” costs and investments to create the network of access points, ensure regulatory compliance, and set up partnerships, can be significant.\textsuperscript{32}

\textsuperscript{30} Ibid.
\textsuperscript{31} Ibid.
\textsuperscript{32} Consultative Group for Assisting the Poor. International Remittances Through Branchless Banking. 2013.
3.3. Literature on Blockchain and the Global Payments System

While recognizing the heterogeneity of regulatory opinions, the broader regulatory stance towards blockchain can be described as questioning towards the bitcoin blockchain (and its impact on currencies, payments, and securities markets), and more positive towards blockchain in other public and private sector cases. Regulators attitude towards blockchain can be gleaned from official and unofficial comments by regulators on blockchain, regulator commissioned-studies on blockchain (several in-house studies have been commissioned, particularly in the financial sphere), surveys on regulatory views toward blockchain, and various reports in the press.

In many countries, governments and regulators are demonstrating an increasing openness to actively engage with blockchain. Indeed, some governments are even openly embracing blockchain as a key strategic pillar for government innovation. A survey conducted by the IBM Institute for Business Value of 200 regulators worldwide found that 90% were planning to engaged in blockchain related pilots, and 14% were already doing so.33 Demonstrating the general enthusiasm for blockchain amongst governments and regulators, multiple countries have initiated blockchain based land registry initiatives.34 The United States government recently completed a defense bill that will include research related to the application of blockchain to critical cybersecurity infrastructure for the federal government.35 According to the IBM Institute survey, the top use cases of interests to regulators in the public sector were in applying blockchain to asset management, digital identity services, citizen services, compliance monitoring, and central-bank issued digital currencies.36

The financial sphere is one area where regulatory enthusiasm for blockchain technology is especially high. Financial regulators in the United Kingdom, Singapore, and Hong Kong, are expanding their understanding of blockchain by participating in fintech accelerators and setting up regulatory sandboxes to understand better how blockchain could be leveraged in the public sector.\textsuperscript{37} The Chinese Ministry of Industry and Information Technology published a white paper, noting blockchain’s potential application to not only a multitude of private sector verticals but also to the central bank’s potential issuance of digital currency on the blockchain.\textsuperscript{38} Several other central banks are also exploring similar use cases.

The general enthusiasm amongst regulators for blockchain in financial services has also spilled over into the area of correspondent banking. Research on blockchain and cross border payments have been commissioned by the research arms of central banks, development banks, and global financial regulatory bodies.\textsuperscript{39} Remittances can be considered a subset of this inquiry. These reports share a common objective in educating financial regulatory authorities and policymakers on the potential applications for blockchain in the payments space.

In aggregate, these studies suggest regulators acknowledge the limitations of the existing correspondent banking system that underlies cross border payments, and interested in blockchain as a solution to those limitations. For example, the 2016 Federal Reserve report on distributed ledger technology notes blockchain could reduce intermediaries, which could yield a more transparent and efficient cost structure for correspondent banking.\textsuperscript{40} Echoing the findings of the Federal Reserve report, a study by the Bank for International Settlement (BIS) recognizes the


\textsuperscript{39} Although there are numerous articles and industry reports promoting the benefits of blockchain to the remittance market, and the broader correspondent banking system, there is an absence of academic research at the intersection of blockchain and remittances.

\textsuperscript{40} Federal Reserve Board. \textit{Distributed Ledger Technology in Payments, Clearing, and Settlement}. 2016.
potential benefits of blockchain in reducing complexity, improving end-to-end processing speed, and decreasing the need for reconciliation across payment, clearing, and settlement activities.\textsuperscript{41} Taking a different angle, an IMF report notes that due to the de-risking phenomenon, blockchain based initiatives could serve as alternative payment mechanisms considering the withdraw of correspondent banks from certain “high risk” corridors.\textsuperscript{42}

At the same time, these studies also raise questions related to the technology and its purported benefits. Given most of the discussion in these papers on the benefits occur at a theoretical level, the authors also express a certain amount of skepticism amongst regulators on whether the technology can deliver upon the promises. For example, the BIS report raises a concerns about the limitations of blockchain, most notably, that certain, “risks associated with payment, clearing, and settlement activities are the same irrespective of whether the activity occurs on a single central ledger or synchronized distributed ledger.”\textsuperscript{43} The US Federal Reserve paper notes that a natural next step in a new technology adoption process would require small scale proofs of concepts, which could be key to garnering stronger regulatory support for a larger scale infrastructure overhaul.

Perhaps more importantly, all these regulatory reports are keen to highlights risks that may accompany the introduction of this new, unproven technology. Questions about blockchain’s vulnerability to operational risks related to money laundering and terrorist financing is one common theme. Another area of regulatory concern is whether the strength of the technology’s underlying cryptography can be guaranteed, particularly given the importance of security in financial infrastructure.

Taken together, these reports reflect a first stab by regulators at understanding blockchain, and how it may impact the global payments space. While recognizing the potential benefits of blockchain relative to existing financial infrastructure, the highlighting of risks suggests regulators remain by and large cautious, particularly in relation to the operational, security, governance, and scalability dimensions of blockchain. These studies also show that the level of regulatory inquiry of blockchain is still early stage. At the time of writing, most of the discussions of benefits and risks remain at the theoretical level, pending regulatory participation in tangible proof of concepts in the payments, settlement, and clearing space.

The report also raises regulator concerns related to shifting from centralized systems to more de-centralized systems. US Federal Reserve report notes that they recognize the blockchain critique of these systems of potentially being vulnerable to single points of failure, centralized entities also have their strengths and are specialists in managing and controlling risks in the payments, clearing, and settlement processes. These centralized systems and their known weaknesses and strengths are compared with the other extreme, which would be utilizing an open and anonymous public blockchain. The concern of government with the risks (and lack of control) of public blockchains may particularly hinder its adoption in financial infrastructure.

Another subtle implication of these recent regulatory studies is that regulators are already pro-actively thinking ahead to the design of blockchain-related policies. It is also clear that regulators acceptance of blockchain based solutions to the cross-border payments system will not hinge on the promise of benefits or improvements in efficiency. The US Federal Reserve Report, for instance, notes that given the wide-ranging implications of overhauling the payments, settlement, and clearing infrastructure globally, in assessing the feasibility of blockchain solutions,

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regulators will also seek to understand how particular solutions impact the fundamental design of the financial system beyond the benefits of a particular use case such as cross border money transfers. This broader system level concern of regulators towards overhauling payments, clearing, and settlement infrastructure may have a major (and potentially unintended) impact on the trajectory of initiatives in niches of the payments space such as remittances.

Beyond the research regulators have conducted related to blockchain and cross border payments, regulators are clearly concerned about activities surrounding cryptocurrencies built on public blockchains. Interestingly, while cryptocurrencies such as bitcoin are arguably what put blockchain on the radar of regulators, it has also been the area that has given regulators the most concerns. This contrasts with the view of regulators to the broader realm of private sector innovation in blockchain, of which governments have generally avoided regulating the underlying technology, and taken a laissez faire approach. A recent discussion paper on distributed ledger technology published by the UK Financial Conduct Authority, lays out this common regulatory philosophy towards new technology, noting a stance of “technology neutrality i.e. not to regulate specific technology types, only the activities they facilitate and the firms carrying out these activities.”

Financial regulators are especially concerned about the risks related to the sharp speculative rise in the price of cryptocurrencies driven by retail investors, the unregulated use of initial coin offerings for venture financing, the use of cryptocurrencies by terrorists and cyber criminals. Government in many markets have already implemented licensing and regulations

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45 Ibid.
related to cryptocurrency exchanges and ICOs.\textsuperscript{48} In some countries such as China, Nigeria, Colombia, and Bangladesh, outright bans on cryptocurrencies have been promulgated. Tax authorities in countries such as South Korea and United States have issued tax collection policies related to gains on cryptocurrencies for investment purposes, which has impacted individuals using cryptocurrencies as a payment medium.

4. Analysis of the Remittance Market

4.1. Overview of the Remittance Market

The most comprehensive aggregate data set on global remittances is collected by the World Bank’s Global Knowledge Partnership on Migration and Development, from which the data in this section draws upon.\textsuperscript{49} The data set provides a general picture of the remittance landscape.\textsuperscript{50}

As illustrated in the chart above, in 2015, global remittances flows was $582 billion, with approximately $450 billion, or approximately 77\%, going to developing countries. In the same year, in terms of total volume, India and China were by far the largest recipients of remittance flows, followed by Philippines, Mexico, and France. As a percentage of GDP, smaller countries


\textsuperscript{50} The actual amount of remittance flows is likely greater, due to the exclusion of informal remittance flows. Other limitations of the data may arise from variations in each country’s approach to compiling remittance data. For example, certain countries collect data on remittances from commercial banks, and do not capture flows from other remittance providers such as money transfer operators.
such as Tajikistan, Kyrgyzstan, Nepal, Tonga, and Moldova would be the highest ranked recipients of remittances. For example, in Tajikistan, remittance accounted for 41.7% of GDP.

Relatively higher income countries – where migrants live and work - were the main source for remittances. The United States, Russia, and a number of the Gulf Cooperation Council states were ranked highest in terms of overall remittance sending volume in 2015. As a share of GDP, Luxembourg, Liberia, Marshall Islands, Oman, and Lebanon, were the highest in 2014.

In 2015, in terms of overall volume, the largest corridor by far was the United States – Mexico ($25 billion). This was followed, in descending order of volume, by the United States – China ($16 billion), Hong Kong SAR – China ($16 billion), UAE – India ($13 billion), the United States – India ($12 billion), Saudi Arabia – India ($11 billion), United States – Phillipines ($10 billion), Saudi Arabia – Egypt ($7.8 billion), United States – Vietnam ($7 billion), and United
States – Guatemala ($6 billion).

Various industry market analysis reports are the main source of information on the competitive environment of remittance service providers. These studies seem to generally accept that banks generally are present as an option for remittances in all countries (and sometimes the only option in certain countries). However, banks generally view remittances as a side-business. The major players in the remittance space are non-banks. Amongst lower income migrants, these non bank money transfer operators provide a network of agents regionally (and sometimes worldwide) that have the reach and convenience that many banks may not be able to match.

Amongst non-bank remittance service providers, global money transfer operators (MTOs) are the most important players. Western Union is the market leader, having over 500,000 agents worldwide operating in 200 countries.\textsuperscript{51} Moneygram is second in market share amongst non bank remittance players, with 350,000 agents in 200 countries.\textsuperscript{52} Aside from the global MTOs noted above, there are also a multitude of MTOs that focus on a single or a few corridor, with no aspiration or ability of expanding beyond that. This is similar to the difference between global banks and regional banks.

The remittance industry continues to be dominated by cash-based physical networks. However, the global spread of digital banking has also given rise to digitally native remittance providers such as TransferWise, Xoom, Remitly, and WorldRemit. This is a relatively new phenomenon in the non bank remittance landscape, although they have become increasingly prevalent in recent years. In response to the rise of digital channels, incumbents have also began to develop their mobile and digital product offerings to complement their physical agent networks. At the same time, most remittance users, particularly lower income clients, have yet to fully

embrace digital. It is estimated that digital’s share of the market was approximately 6% in 2016, although growth of the digital channel will likely outpace other channels.53

4.2. Remittance Business Model

4.2.1. Actors in a Remittance Transfer

This section and its content and frameworks draws heavily upon the BIS General Principles for International Remittances Services, with adaptations to the specific circumstances of this thesis.54 At the highest level of magnification, a remittance needs three actors: the sender, the receiver, and a remittance service provider. In reality, there often are many more actors involved – a situation which gives rise to the common critique of the need for simplification from technologies such as blockchain.

Firstly, there may be two remittance service providers involved in a transaction, one involved in the sending country (often called the sending country remittance provider), and another involved in the country receiving the remittance (often called the receiving country remittance provider). When there are two remittance providers, the two parties need to collaborate to manage the fund transfer. This is not necessary when a single global remittance provider has services in both sending and receiving countries.

Secondly, remittance providers need access points for clients to send and receive money. Banks - if playing the role of remittance providers themselves - will use their branches. Non-bank remittance providers, in contrast, do not have their own branches, and therefore leverage the physical infrastructure of agents. This could be a grocery store, a convenience store, a drug store,

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a gas station, or any number of other types of physical access points located in client communities. The exception to physical access points are digitally native remittance providers, although this is a relatively new phenomenon, and limited to a small sub-sector of remittance clients comfortable with transacting by mobile phone and internet.

Thirdly, banks play a key role in the background of a remittance. Remittance service providers will usually make use of banks to transfer the actual monetary funds. Sometimes, when crossing borders, money may take a circuitous path through a number of banks, before reaching an end client’s bank account. As mentioned earlier, it is possible that remittance service providers themselves are banks. But even then, many small and regional banks may still require the use of correspondent banks – banks with relationship with banks in other countries - to move money across borders.

Finally, remittances rely upon messaging networks to transfer payment information in a standardized way between stakeholders in the remittance ecosystem. The commonly utilized global payment messaging system is run by the Society for Worldwide Interbank Financial Telecommunication (SWIFT), founded in 1973. The need for such a messaging system arises from the lack of interoperability between payment systems and messaging protocols of different countries. The over 8,000 member banks use SWIFT to create formatted messages that are then routed through SWIFT for delivery to other banks, thus facilitating the information flow for cross border payments. Importantly, the SWIFT network does not actually transfer money, but is a standardized secure messaging system.

4.2.2. Remittance Transfer Process

The most observable parts of the remittance process occur at the beginning and end: sending funds and receiving funds. There are a variety of ways for funds to be sent and received
(from cash to electronic transfers on the mobile phone), and depends largely on the options provided by the remittance provider. Between these two end points of sending and receiving money, are less obvious, but equally important activities. Much of the complexity attributed to remittances originates in these hidden processes, such as messaging, settlement, and liquidity provisioning.

Activity 1: Sending Funds

The first activity in a remittance is the sender (usually a migrant) paying an agent in the sending country. The access point could be a physical location such as a bank branch, supermarket, travel agency, convenience store, gas station, or post office. Digital access points such as the internet and mobile have also gained traction in recent years.

If the sender has a bank account, he/she can send directly from the account, using a check or debit card. Ultimately, the remittance provider’s payment options will impact the sender’s options. Cash is still the preferred method for sending money for the remittance client. Cash, for example, is usually not an option for new digital-only remittance providers.

During the sending process, the agent in the sending country will generally request some basic information from the sender to comply with Anti Money Laundering (AML) and Combatting the Financing of Terrorism (CFT) regulations. For security reasons, sometimes an agent will provide the sender of funds with a transaction code, which the sender can pass on to the recipient of the funds. The recipient will then use the code to verify his identity when picking up funds.

Activity 2: Disbursement of Funds

At the other end of a remittance is the disbursement of funds to the recipient in the receiving country. When a recipient claims funds from the disbursing agent, there are also many different
access points and payment options, similar to sending funds. Disbursement in cash is still the preferred method of migrant populations, although direct transfers to bank accounts are also common.

The disbursing agent will also conduct basic verification of the sender and recipient. If the disbursing agent is a bank, then the verification usually would be similar to any other bank transaction for the withdrawal of funds from a bank account. The currency (and related foreign exchange rate) in which the payment is taking place will need to be considered in calculating the final disbursement amount.

Activity 3: Messaging

Messaging can be defined as the transfer of information about a remittance from the sending country agent to the agent in the receiving country at the end of the process. Importantly, payment information can travel separately from the funds. Practically, it can go directly from the agent in the sending country to the disbursing agent, with a copy to the remittance service provider. When there is no direct relationship between the remittance provider in the sending country and its agent, and the remittance provider in the receiving country and its agent, information on the remittance will usually travel together with the funds. In this type of arrangement, because there is no easy way to communicate, transferring information can often be cumbersome and time consuming. This is largely due to the absence of a standardized messaging format between different actors in the remittance process, and manual labor may be required to handle the translation from one format to another as information is passed on.

Activity 4: Settlement
Settlement, in contrast to messaging, is the process for transferring the actual money, with varying models, speeds, and levels of complexity. A remittance can involve a series of in-between payments through various entities, with one of the payments in the series involving a cross-border payment, typically running through the correspondent banking system.

Payments between agents and remittance service providers are generally done by batch, especially when there is an ongoing two-way flow of funds between remittance providers. Given the small size of remittances, the process is sometimes further simplified through netting. That is, within a specific time period, outgoing funds from an agent to the remittance provider are netted against incoming funds from the remittance provider creating a single payment. The actual amount of funds to be settled may be small after netting.

Some remittance providers may also have bank accounts in both the sending country and receiving country. If this is the case, the cross-border element can be internalized. The funds from the agent in the sending country can be credited to the remittance provider’s bank account in the receiving country, and then transferred to the agent in the receiving country for disbursement. All of this can happen and be recorded internally by the firm. At some point, depending on the volume of flows, the remittance provider may need to top up its account in a particular country.

One new variation of the settlement model being pioneered by start-ups involves pairing individuals and corporations who are sending money in different directions.\textsuperscript{55} If a sender in Country A wants to send funds to Country B, the company, acting as a middleman, will locate a sender in Country B who wants to send an equal amount of funds to Country A. Instead of having money flows “cross borders”, transfers are simply paid out domestically, and avoids the need for using correspondent banking.

\textsuperscript{55} The startup TransferWise is an example of this model.
Activity 5: Liquidity

To allow agents to pay funds to customers prior to receiving the actual funds from a sender, sometimes liquidity arrangements need to be made. In this type of scenario, the settlement of funds may actually occur after the disbursement of funds by the agent to the end client. This is often the case for MTOs who have large agent networks, where the MTO does not know which access point the receiver of funds will ultimately cash out from.

In providing upfront liquidity to agents, liquidity is needed in advance by agents, and credit risk arises because payments are made before funds are reimbursed. The cost of funds of this liquidity will also need to be calculated. As such, if more liquidity provisioning is required, the overall price of the service may also increase. The higher pricing is counter-balanced by client demand for speed and convenience of disbursement.

4.2.3. Remittance Business Models

Below is a description of the main remittance business models.

Unilateral Model

When a single remittance provider handles the entire remittance process without involving other entities such as agents, it is engaging in a unilateral model. This is the case when a remittance provider is a bank with global reach, and its own physical network of branches in multiple countries. In practice, this model is limited in usefulness to remittance clients, since few global banks are likely to strategically place their branches in communities of migrants and their families in their country of origins, much less achieve this in multiple countries.
A new variation of the unilateral model involves a single firm providing a digitally native network of access points through a mobile app or internet website portal. For the time being, this type of model is also limited due to client’s preference for cash and physical agent access points.

Franchise Model

In a franchise model, a central remittance provider does not have its own access points and leverages agents to create a network of physical access points. The central remittance providers handles the infrastructure, such as marketing, and processes, such as settlement and messaging, to support the remittance service. Global money operators such as Western Union and Moneygram are examples of this dominant model in the remittance market.

Negotiated Model

A negotiated service model occurs when a remittance service provider negotiates with a limited number of institutions to create an adequate network of access points. For example, two banks could sign a bilateral agreement in a sending and receiving country. This arrangement can involve multiple institutions in the receiving country, and may cover multiple remittance corridors, with different partner institutions in each. The main point of a negotiated model is “tailored” cooperation on a remittance product between non-competing organizations.

Open Model

Under the open service model, a remittance provider obtains access points in a receiving country by using an open network. This model is the most common remittance service provided by banks, when they act as remittance service providers (and agents) themselves. Practically
speaking, the only example of this model is the correspondent banking system, which allows most banks (who do not achieve a global scale) to send a remittance to most other banks anywhere in the world. Importantly, non-bank remittance providers can have access to this network as customers of banks.

Banks at the two end points of a remittance transaction in an open service model do not necessarily have a bilateral relationship. The implication is that the final cost of remittances may not be known until the very end (as it depends upon foreign exchange rates, as well as the various middlemen transaction costs as it moves through the correspondent banking system). This contrasts with a franchised model with a centralized operator, or a unilateral model. Criticisms aside, this model is vital to enabling remittances in small corridors, because of the coverage of banks in every country worldwide.

Illustration of a Remittance Process

As a foundation for understanding how blockchain may change the remittance process, below is a stylized example of a remittance process, adapted from the BIS General Principles for International Remittances Services.

Example 1
In Example 1, a sender in Country A is remitting funds to a receiver in Country B. In this example, the agent and remittance provider in Country A are different entities. Furthermore, the sender, the agent, and the remittance provider, all have bank accounts in Currency A at different banks in Country A. A similar situation occurs in Country B, where the remittance provider and agent are different entities, and the receiver, agent, and remittance providers all hold Currency B in different banks in Country B.

As the first step, the sender pays Agent A in the sending country using Currency A. If the sender has his funds stored in a checking account, similar to a normal domestic payment, funds are debited from the Sender’s bank account at Bank 1, and credited to Agent A’s bank account at Bank 2.

In the second step, Agent A pays the remittance provider in Country A (RP A). Instead of paying RP A for each small remittance transaction, Agent A and RP A will settle payments in aggregate at day end. The Agent makes a bank transfer from Bank 2 to the remittance provider’s account at Bank 3. This is also a normal domestic payment.

For the third step, RP A transfers funds to the remittance provider (RP B) in Country B. The funds transferred by RP A to RP B may include the aggregate of many remittances collected by numerous agents within its network in Country A. To transfer the funds across borders, the correspondent banking system is utilized. RP A requests Bank 3 to make an international transfer of Currency B to RP B’s bank account at Bank 6. Because Bank 3 is a local bank, it does not handle international payments, but must transfer funds through a correspondent bank, Bank 4. Bank 3 provides information on the transfer to Bank 4, which will request the transfer of funds in Currency A, at an amount that depends on the exchange rate Bank 4 utilizes.
Afterwards, Bank 4 debits the funds from Bank 3. Bank 4 also holds an account with Bank 5 in Country B in Currency B. Bank 4 proceeds to instruct Bank 5 to credit the account of the remittance provider in the receiving country (RP B) with the specific amount of the remittance in currency B (either on a cash or credit basis if liquidity arrangements have been made). Bank 4 may need to top up its account in local currency in Bank 5 from time to time to keep an appropriate level of funds available. Bank 5 proceeds to transfer funds to Bank 6 and credit the account of RP B.

In the fourth step, RP B pays the disbursing agent in Country B by instructing Bank 6 to pay the agent’s account at Bank 7. Agent B proceeds to provide the money to the recipient of funds at its access point. Agent B will have already received information on the sender and recipient for validation purposes, through the transfer of information through the messaging system.

This example illustrates the potential complexity involved in making a remittance, even of a small nominal amount. The actual process may be much simpler, depending upon what type of business model is utilized: negotiated, unilateral, open network, or franchised.

One variation of Example 1 is suggested in Example 2 below. In this case, the remittance provider and agent use the same bank (Bank 3) in the sending country. Furthermore, the bank has cross border payment capabilities. Specifically, Bank 3 has a correspondent banking relationship with Bank 6 in Country B, which also has its own correspondent banking relationship. This eliminates the need for Bank 4 and Bank 5 to be involved in the process.

*Example 2*
A further simplification is presented in Example 3 below. Here, the banks themselves act as the remittance provider and agent in their respective countries. Both banks also have correspondent banking capabilities. The sender and receiver also hold accounts at Bank 3 and Bank 6, respectively. Therefore, the bank is also the access point for the sending and claiming of funds.

Example 3

A final variation is presented in Example 4 below. In this franchise example, a global non-bank remittance provider handles the role of remittance provider and agent in both countries. Because RP is a non-bank, it still needs the correspondent banking system to transfer funds internationally, and therefore holds bank accounts at Bank 3 in Currency A and Bank 6 in Currency B. Bank 3 and 6 have a correspondent banking relationship.

In the below example, if the business handled is predominantly one way, from Country A to Country B, over time, RP will accumulate a surplus of Currency A in Bank 3. It will need to
transfer Currency B to its account in Bank 6. The foreign exchange rate at the time of this transaction may vary compared to the transaction carried out on the day between sender and remittance provider. This mismatch in timing in foreign exchange transactions (particularly for volatile currency pairs) may give rise to further price implications for the final transaction.

*Example 4*

![Diagram of remittance process](image)

In conclusion, the examples above demonstrate the high level of heterogeneity in a remittance process, with varying degrees of complexity, transparency, efficiency, and speed. The implication is that characterizations of the global remittance market as homogenous are likely to lead to oversimplifications on solutions to the challenges in the market.

### 4.2.4. Remittance Fee Structure

Remittance fees are highly complex and variable compared to their presentation in the mainstream media. When simplified, the cost of remittances includes two key components: the service fee and the hidden foreign exchange rate spread. The slow speed of settlement, could also lead to a third hidden cost for consumers, but to a lesser extent.

<table>
<thead>
<tr>
<th>Fee Component</th>
<th>Type</th>
<th>Description</th>
<th>Average Cost (% of Remittance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Fee</td>
<td>Visible</td>
<td>This fee is charged by the agent in the sending country, typically paid by the sender. Usually, the service fee is quoted</td>
<td>~7.7% globally;</td>
</tr>
</tbody>
</table>

...
in nominal terms, but sometimes is quoted as a percent of the principal to be sent. This fee is what is usually equated with the all-in costs to consumers in public statistics on remittances, although it does not capture hidden costs to a client such as foreign exchange rate spreads.

<table>
<thead>
<tr>
<th>Service</th>
<th>Hidden Fee Description</th>
<th>Cost Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Exchange Rate Spread</td>
<td>This hidden fee is the difference between the retail foreign exchange rate charged to the client, and the actual wholesale foreign exchange rate paid by the remittance provider. This fee is less visible, as it is embedded in the daily (and fluctuating) foreign exchange conversion rate.</td>
<td>N/A</td>
</tr>
<tr>
<td>Speed of Settlement</td>
<td>Clients could also shoulder the cost of the oftentimes slow speed of settlement. When settlement is not instantaneous – which is generally the case when involving multiple banks in the cross-border transfer of funds – banks earn an indirect fee on short term interest (float) by investing funds before delivering them onwards in the settlement chain. This float can be significant for large volumes of cross border flows.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### 4.2.4.1. Service Fees

In regards to transaction costs of remittances, a commonly cited statistic is that migrants globally pay on average 7.7% in fees on the principal balance of a remittance.\(^{56}\) This refers only to the remittance service fee, but usually does not include hidden costs related to the foreign exchange rate spread and slow speed of settlement.

Moreover, as it relates purely to service fees, there is considerable variation, with larger remittances generally lower priced. Smaller ticket size remittances sent by migrants are therefore more costly, as fixed costs of operations (salaries, compliance, marketing, etc.) are still allocated equally to large and small sized money transfers alike. Smaller volume remittance corridors usually experience higher costs as well.\(^{57}\) The channel utilized for the transaction (digital versus agent versus phone) can also drive different pricing. Further complicating the picture, even the same remittance provider will vary pricing significantly within a single country. For example, sending a remittance California to Mexico may vary significantly in price from sending a remittance from a location in Texas to Mexico. This price variability is often internal to a particular


business and may be driven by a number of factors, for example, the different costs of commissions to agents operating in different locations.

With all the caveats above in mind, as estimated by the World Bank, the below charts show the top ten corridors with the highest and lowest costs for a $200 remittance transaction.58

The top ten lowest cost remittance corridors include a number of regional corridors connecting countries within the former Soviet Union. Looking beyond the top ten list, the top 11-20 countries with lowest cost corridors also include Russia – Uzbekistan (1.7%), UAE – Pakistan (1.7%), Singapore – Bangladesh (1.9%), UAE – Yemen (2.3%), Russia – the World (2.4%), UAE – India (2.8%), United States – India (3%), Saudi Arabia – Bangladesh (3.1%), Costa Rica – Nicaragua (3.1%), and Costa Rica – World (3.1%). These markets exhibit high levels of efficiency in regards to pricing.

In regards to the cost of different providers, a World Bank study looks at the difference in costs for small amount remittances in various corridors, depending upon the choice of MTO or Bank.59 It reveals that for a sample of corridors, money transfer operators such as Western Union generally have lower costs, sometimes significantly lower, for smaller dollar transactions.

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A World Bank chart comparing remittance cost by service provider type (below) also shows that bank remittance service fees are almost twice as expensive than money transfer operators. This corroborates the evidence that banks continue to focus on larger sized cross border transactions, and do not view remittances as a key business line. Interestingly, the chart below also reveals how mobile based digital remittance providers have prices at half the cost of money transfer operators, suggesting that conversion of remittance clients from physical cash based transactions to mobile based transactions, may be the most significant driver of service fee cost reductions over the long run. At the same time, it would be premature to draw definitive conclusions, as data on the profitability on newly established mobile based remittance is unclear. Nor is their pricing structure related to hidden fees such as foreign exchange spreads.

Average Remittance Service Fee Cost by Service Provider\(^{61}\)

4.2.4.2. Foreign Exchange Rate Spreads

From a remittance provider’s point of view, the foreign exchange margin is a type of protection against exchange rate volatility (although it can be argued that such foreign currency volatility protection could be priced in a more transparent manner to clients). Regardless, the current practice of embedding the margin in the foreign exchange rate makes it difficult for clients to compare pricing and make informed choices. Sometimes, the fee can only be calculated at disbursement (especially in an open model where banks in the sending country and receiving country do not have a bilateral relationship). The ability to provide an upfront quote to the sender on the final disbursement amount is an advantage of a centralized provider franchised model such as Western Union.

While aggregate data on the embedded fees related to foreign exchange rates is difficult to find, one study, for instance, calculated the average four day spread on wholesale foreign exchange rates (to smooth volatility) in various corridors published on Bloomberg, and the the foreign exchange rates charged to customers by Western Union and Moneygram in those same corridors. The data from the study indicates that similar to service fees, foreign exchange rates are highly
variable based on corridor and provider, and often a significant cost.62

Approximate Foreign Exchange Rate Spread Fee (% of Remittance Principal)63

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Western Union</th>
<th>Moneygram</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA-Turkey</td>
<td>5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>USA-Mali</td>
<td>3%</td>
<td>1.5%</td>
</tr>
<tr>
<td>USA-Vietnam</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td>USA-Ghana</td>
<td>0.5%</td>
<td>3%</td>
</tr>
<tr>
<td>USA-Kenya</td>
<td>4%</td>
<td>3.5%</td>
</tr>
<tr>
<td>United Kingdom-Turkey</td>
<td>6%</td>
<td>N/A</td>
</tr>
<tr>
<td>United Kingdom-Mali</td>
<td>4%</td>
<td>N/A</td>
</tr>
<tr>
<td>United Kingdom-Vietnam</td>
<td>3%</td>
<td>N/A</td>
</tr>
<tr>
<td>United Kingdom-Ghana</td>
<td>0.5%</td>
<td>N/A</td>
</tr>
<tr>
<td>United Kingdom-Kenya</td>
<td>3%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

While the original motive for foreign exchange rate spreads were to control for foreign exchange volatility, the fees may have outgrown their original intent, and simply evolved into a much more significant part of the fee structure and the way in which providers generate additional profit. Regulators have raised concerns about the lack of consumer transparency revolving around foreign exchange spreads, although no practical improvement in the situation has occurred so far.64

4.3. Costs Drivers in the Remittance Market

<table>
<thead>
<tr>
<th>Cost Driver</th>
<th>Contributing Factors</th>
</tr>
</thead>
</table>
| “Last Mile” Agent Network Infrastructure| • Agent network acquisition  
• Ongoing agent commissions  
• Agent network maintenance  
• Liquidity provisioning to agents  
• Compliance and security related to cash handling |
| Correspondent Banking Infrastructure  | • Lack of interoperability  
• Dated messaging protocol (SWIFT)  
• Lack of alternatives to correspondent banking  
• Speed of settlement |
| Legal and Regulatory Requirements    | • Licensing requirements and fees  
• Bonding requirements  
• Ongoing anti-money laundering costs  
• Ongoing anti-terrorist financing costs  
• Compliance and security related to cash handling  
• Non bank remittance provider access to payments and banking infrastructure |

63 Ibid.
### Lack of Competition

- Market power and scale advantages of incumbent remittance players
- Cost of building agent network infrastructure
- Agent exclusivity arrangements
- Regulation and licensing
- Regulatory limitations on non-bank remittance providers
- Lack of alternatives to correspondent banking
- Small volumes of certain corridors

#### 4.3.1. “Last Mile” Agent Network Infrastructure

Costs remain high for remittances because migrants highly value convenience at the expense of higher prices. Many migrants still prefer to transact through the cash-based agent franchise networks, such as those offered by global giants such as Western Union and Moneygram, or through smaller agent corridor-specific remittance providers. Migrants value this convenience of being able to handle remittances in a local grocery store, gas station, or post office. Put simply, a material portion of the cost involved in a remittance is in the first and last mile of a remittances.

It can be argued that the entire business model of specialized money transfer operators such as Western Union is built around scaling agent networks. The cost implications are fourfold. Firstly, providers need to identify and acquire networks of agents in the countries in which they operate. And these costs of negotiating and building out agent networks are substantial. Secondly, providers need to invest and maintain the business processes, compliance processes, and messaging and settlement infrastructure, to ensure these agent networks run seamlessly. Thirdly, remittance providers need to provide a commission to agents for each remittance processed. And if agent access points are in high demand, agents have significant bargaining power over commissions (but this varies country by country, and region to region). Fourth, to ensure that funds can be disbursed to end clients promptly, remittance providers may provide liquidity upfront to agents. The cost of funds of this upfront liquidity can also be substantial for large agent networks.

Interestingly, even with all these costs involved in building out agent networks, MTOs still
tend to be significantly cheaper on average than banks acting as remittance providers. This is because banks, as providers of a broader suite of financial products, tend to have higher costs of staffing, infrastructure, and security. Remittances, as a side product in their portfolio, are still allocated a share of the bank’s overall overhead costs. As such, small ticket size remittances are unlikely to be viewed as profitable relative to larger transaction size products in the bank.

Additionally, most remittances processed at agent access points start and finish as cash (or cash like instruments such as money orders). Cash handling not only requires human staff, but will usually entail additional layers of compliance and security. The preference for cash-based disbursements at physical agent locations may change over time as consumers become more comfortable with transacting digitally. This price impact from moving physical remittances to digital (automated) remittances cannot be understated, and may be one of the fundamental future drivers of decreases in remittance costs. But the digitization trend will likely take time.

### 4.3.2. Correspondent Banking Infrastructure

Correspondent banking is the most widely used underlying system that remittance service providers leverage to transfer funds across borders. Not only is it a commonly cited as a contributor to the higher cost structure of remittances, but amongst many blockchain advocates, the high costs of remittances is almost exclusively associated with the correspondent banking system.

When transferring funds between countries, straight through processing is generally difficult due to the lack of interoperability between payment systems and the lack of pre-existing direct relationships between banks in different countries. Correspondent banks act as the middleman, helping to facilitate the movement of funds between banks in different countries, where pre-existing bilateral relationships do not exist.
This is a problem in the open service model explained earlier. In the open service model, banks act as remittance providers. However, because banks (many local banks with limited capabilities), have no direct contact or negotiation between banks in other countries, information about remittances need to travel with the funds, so the disbursing banks cannot pay out before funds have been paid. Speed is determined by the pace of the settlement process, which can still be days.

Funds often go through multiple correspondent banks, each which facilitate the flow of funds but also take a fee along the way. Those fees are ultimately paid by the sender of the payment. While larger value payments can spread these costs over a larger base, the system can be expensive for processing small-value remittances.

Furthermore, moving funds through correspondent banks also provides an opportunity for these middlemen to make profit on the “float” for holding those funds for short durations prior to passing them onwards through the settlement chain. The lag in settlement time – exacerbated by the incentive to take float - also causes additional foreign exchange risk, particularly for volatile currencies. To its credit, correspondent banking system virtually ensures that if a country has a bank, there is a possibility for a remittance (or a cross border transfer more generally), to occur. The speed and cost of the transfer, though, may not be optimal.

Recent years have also seen a general trend towards concentration in the number of correspondent banking providers that have increasing power over the market. Furthermore, because of de-risking post financial crisis, many correspondent banks are increasingly hesitant to provide services in certain high risk foreign currencies, particularly due to the risk of economic sanctions or fines, and the general cost of compliance.

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66 Ibid.
Franchise, unilateral, and negotiated remittance models may do relatively better in speed, although they still must work through correspondent banking rails. A centralized remittance provider such as Western Union, for example, can separate the settlement and messaging processes. With its captive agent network, it can agree to provide liquidity in advance to disbursing agents, who can disburse funds to an end client prior to actual settlement of funds. While this ensures faster speed, correspondent banks may still take a fee for moving funds, and foreign exchange risk also persists.

SWIFT, as the messaging system that facilitates transfers through correspondent banking, is often targeted as the primary problem. But SWIFT did not produce the current correspondent banking system and its inadequacies. On the contrary, SWIFT resulted from the need to have a standardized messaging protocol for this flawed, patchwork cross border payment system. Many of the critiques of SWIFT are ultimately deeper critiques of correspondent banking itself. It is likely that upgrades to the SWIFT messaging protocol can provide notable benefits in regards to speed, transparency, and predictability of payments, without necessarily solving the fundamental design issues of the correspondent banking system.

A fundamental re-thinking of the underlying cross border infrastructure is the fundamental solution to the correspondent banking system. More specifically, a solution that achieved seamless global interoperability across all banks (and remittance providers), and in doing so, allow instant settlement of funds. However, the coordination and consensus required to achieve interoperability across countries and providers will be a difficult task.

4.3.3. Legal and Regulatory Requirements

The key objective of regulation of remittances relates to regulatory goals of combating money laundering and terrorist financing. This compliance-related cost manifests itself in several
ways. Many of these requirements are appropriately designed to ensure remittance providers remain financial robust and secure. While no empirical evidence exists, the country-to-country heterogeneity of regulations vis-a-vis remittance providers suggest regulations may be onerous in some countries (and also costly), but also potentially overtly lax in others.

Firstly, while specific requirements vary country by country, remittance providers usually need to be licensed by national regulators. Licensing may imply application fees, minimum paid in capital requirements, bonding requirements, liquidity requirements, putting in place enterprise risk frameworks, as well as the time and staff required to go through a licensing process.

Secondly, ongoing operations must invest in the staff who design and carry out the controls and regulatory reporting, such as know your customer (KYC) requirements and recording and reporting of individual transactions, particularly suspicious transactions. Because the compliance monitoring for a single loan does not vary based on size, the costs are disproportionately higher for smaller value transactions such as remittances. Western Union executives have noted that large money transfer operators often have fraud and compliance-related fines, which they build into their business models, and ultimately pass on to their customers.67 Cash management at the first and last mile is a further dimension to be regulated with costs passed on to consumers.

Countries with multiple regulatory authorities may further raise licensing and ongoing compliance costs. A good example is the United States, where money transfer operators need to acquire licenses in multiple states, not to mention the ongoing compliance reporting at the state and national level. To start a money transfer business with offices in all these states would require bonds and net worth of nearly $10 million.68

In certain countries, legal and regulatory frameworks may be designed to make accessing payment infrastructure and national clearing and settlement systems overly difficult and costly for non-bank remittance providers. On one hand, non-bank remittance providers are specialized in providing remittances versus banks. Yet regulators also view direct access to payments infrastructure as a potential risk point, and prefer non-banks maintain indirect access through the correspondent banking system.

For money transfer providers that focus on small dollar remittances, some argue that the small values make it unlikely that remittances pose a systemic risk issues, yet they are still regulated like banks.\textsuperscript{69} Therefore, a case could be made for a more specialized “lighter touch” license, rather than requiring remittance businesses to acquire a license with the higher costs and regulatory burden of any financial institution. Certain academics have also suggested risk based approach to AML and KYC, with sampling for smaller dollar sized remittances, rather than compliance monitoring and reporting for each transaction.\textsuperscript{70}

Globally, there continues to be no consensus on how to regulate remittance providers. However, best principles have been offered by institutions such as the Bank for International Settlements. Regardless, it is unlikely that regulation and compliance will disappear as a key cost driver in the remittance business.

\textbf{4.3.4. Lack of Competition}

Research has shown a correlation between the level of competition in a market for remittances, and the price of remittances.\textsuperscript{71} Unpacking the competitive landscape reveals some

unique market dynamics which may contribute to the lack of competition in certain remittance corridors.

Firstly, certain factors shift market power considerably in the favor of large incumbents such as Western Union and Moneygram. With large remittance volumes, they are able to spread their regulatory and infrastructure costs more widely. They often will have captive networks of agents in the many countries that they operate in. The situation may resemble an oligopoly in many countries, where money transfer operators have a large influence over pricing.

The remittance business requires large infrastructure investment to build out agent networks. The cost of building out these networks, and the scale economics needed to make a profit, tend to favor the large incumbent global MTOs. Smaller startups are dis-incentivized to attempt to compete in this niche, given the long tail of investment. In many countries, incumbent MTOs also enter exclusivity arrangements with agents. Given the limitation of physical access points and infrastructure, this creates important first-mover advantages to incumbents who are already in the market. Granted, there may be markets where agents have bargaining power and may switch if offered higher commissions. But by restricting choice, de facto monopolies are created. Certainly, as consumers gradually migrate to digital channels for remittances, this situation may change over the long run.

Remittance is also a regulated business, which becomes a material cost item both in the startup phase for new entrants, and on an ongoing basis. Moreover, remittances as a business generally requires scale, which implies the need to operate in multiple countries. This also implies the need for investing in licensing and compliance in multiple jurisdictions. In certain countries, regulations may make it particularly difficult for new players to access payments and banking infrastructure relative to incumbents. This creates an additional perceived barrier to entry for
Furthermore, small non-bank remittance providers rely upon banking relationships to transfer funds across borders. However, some banks, for pure competitive reasons, may be reluctant to enable non-bank competitors in the remittance space. In other circumstances, banks may channel the concern of regulators that non-bank remittance providers could increase anti-money laundering and terrorist financing risk, and therefore shy away from forming ongoing relationships with remittance providers. De-risking, or the pull back of correspondent banks from certain corridors is a manifestation of this concern. Certainly, this will only impact certain corridors and certain remittance providers, but all in all, it contributes to additional effort and cost on the part of remittance providers, particularly newer players, to establish their businesses.

Secondly, lack of competition in certain corridors may also be a simple result of the small volume of remittance flows in that market. At the same time, many larger corridors with larger populations of migrants, unsurprisingly, are characterized by multiple competitors and products with pricing that resembles more of a commodity.

Thirdly, the impetus for overhauling the correspondent banking system has historically been lackluster, given the lack of alternatives to the current system. Much of the criticism of SWIFT and its lack of urgency in making incremental upgrades to its messaging system to optimize the settlement process for member banks, may be due to the lack of any competitive pressure. Given that many correspondent banks make income off the float from transferring funds across borders, they may also not have a strong incentive to overhaul the system and rationalize their role in it.

5. Analysis of Blockchain’s Application to Remittances

5.1. From Bitcoin to Blockchain
An understanding of blockchain technology should begin with a description of its origins in bitcoin. Bitcoin’s provenance can be traced back to an online whitepaper published by an author who to this day, is unknown to the public, but who penned the article under the pseudonym of Satoshi Nakamoto.\(^73\) Bitcoin can be considered the first use case of blockchain, the underlying shared ledger technology that allows for decentralized applications (in the case of bitcoin, a decentralized application for payments). Bitcoin emerged in 2008 and was envisioned as a purely digital currency to handle the transfer of value from one party to another. Transfers between one party to another would be instantaneous and as simple as an email.

Bitcoin, unlike fiat currencies issued by central banks, was envisioned as a peer-to-peer form of money that does not require a central operator. De-centralization, therefore, was a fundamental feature of bitcoin. A central operator was considered undesirable, because early adopters of bitcoin were suspicious of trusted third parties - whether it be the Federal Reserve, or Citibank, or Paypal – and motivated by the goal of creating a currency outside the control of government.\(^74\)

Aside from its design as a de-centralized system, the currency also aimed to reduce government control through other means. The bitcoin protocol limits the supply of bitcoin to 21 million bitcoins that can ever be created, in contrast to fiat currencies, which in theory, have no

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\(^74\) Ibid.
limit on the issuance of new money supply. Bitcoin would also be built on a public ledger (open to all). But every transaction would also be pseudo-anonymous: while anyone could review the history of bitcoin, transactions are only linked to an electronic address. Bitcoin’s pseudo-anonymity has given rise to concerns of regulators and law enforcement officials.

Blockchain – a system for managing records in a de-centralized manner - comes into play as the system underlying bitcoin to achieve de-centralization. Arguably, interest in blockchain as an underlying technology has equaled, and in some cases, surpassed interest in bitcoin. The bitcoin blockchain cannot be generalized to represent the technical design approach to any blockchain. However, the bitcoin blockchain design was quite innovative, and continues to be widely copied by designers of other public blockchains.

More specifically, the bitcoin blockchain was designed as follows.75 Time stampers – who are called miners - verify and add transactions into a block (a batch of transactions) by using the processing power of their computers to compete to solve complex mathematical calculations. The miner who wins the competition then verifies the block of transactions and adds it to a chain comprising the history of transactions. The new block is broadcast to the public network so that all nodes agree on the new information, and everyone’s copy of the shared ledger is updated. Each block is cryptographically linked to previous blocks to help preserve the integrity of the ledger.

As a public blockchain, any individual could participate as a peer to peer computer node on the network. No private individual or organization would hold the key to the “truth”; any loss (or manipulation) of the ledger’s information can be recovered as any change must be reconciled amongst multiple public nodes in the bitcoin network holding copies of the ledger. Each peer to peer node has no basis to trust another node, but bitcoin’s design makes it, in theory, tamper proof.

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The reasoning for creating the elaborate competition amongst miners is so miners have incurred a real financial cost. Yet at the same time, whoever wins the right to timestamp a block of transactions is rewarded with newly created bitcoin, along with the transaction fees, denominated in bitcoin, paid by the sender. The financial reward replaces for the need for a centralized party. A marketplace of miners incentivized to verify transactions honestly maintains the system’s integrity. Moreover, the very bitcoin rewarded to miners is also the currency used for the payment system.

Miners, to realize their wealth, will exchange bitcoin for fiat currency, thus pushing out the supply of currency to the broader population. Paradoxically, bitcoin exchanges worldwide have been created to act as a third party to facilitate the exchange of bitcoin with fiat currencies, because most existing and potential bitcoin holders lack the technical know-how (or patience) to transfer bitcoin without the use of a third party (centralized) rail. Multiple security breaches of third-party exchanges such as Mt. Gox, have demonstrated that while bitcoin’s underlying ledger has so far been tamper proof, the surrounding ecosystem remains highly fragile.76

As the number of miners competing has increased, the mathematical puzzles have become more complex, and require more processing power. Rather than individuals mining in their homes, bitcoin mining conglomerates now pool large resources to win the competition. The concentration of nodes in the hands of mining conglomerates is important because of bitcoin’s governance structure. Any fundamental change in bitcoin’s core code need to be agreed to by at least 51% of the nodes in the network, what was considered a very high hurdle for a de-centralized system. Practically speaking, large bitcoin mining consortium’s now have a major say in bitcoin’s

governance, which critics say is in direct conflict with the spirit of the original design as a public and de-centralized blockchain.\textsuperscript{77}

Bitcoin has so far enjoyed a meteoric rise in adoption, but mainly as a speculative commodity. In 2017, bitcoin has entered a major bull cycle. As of mid-year, 2017, the estimated number of active outstanding digital bitcoin wallets has increased from 11 million at the beginning of the year to almost 15 million.\textsuperscript{78} In the same period, the price per bitcoin has increased from $960 at the end of 2016 to $2434 by mid-year 2017.\textsuperscript{79} This continued price appreciation has further driven adoption of bitcoin. Most recently, the launch of bitcoin futures, may contribute to the mainstreaming of bitcoin as an asset class.\textsuperscript{80}

Bitcoin remains a novelty, as a payment device, without widespread adoption. However, the practical operating environment has presented a number of challenges that dilute its benefits and hinders switching. For example, consumer’s enduring preference for fiat currency, requires an entire ecosystem of fiat-bitcoin currency pairs, that complicate the original use case of fast, instantaneous settlement. Bitcoin’s price continues to exhibit major volatility, further hindering its adoption as a payments medium.\textsuperscript{81}

Bitcoin’s use as a payment medium has also further restricted or hindered by regulation in countries. Governments continue to harbor suspicion and concern about the currency’s use in money laundering, terrorist financing, and other illicit activities. In a testament to bitcoin’s censor proof design, governments have only been successful at regulating or banning the third party on-ramps to bitcoin. Individuals or entities can still transact in bitcoin if they possess the requisite

\textsuperscript{79} Ibid.
technical know-how.

Important niche use cases do exist that leverage upon bitcoin for payments. For example, certain countries with inflationary currencies, such as Argentina and Zimbabwe, have witness bitcoin adoption. Another emerging use case for bitcoin is in cross border payments, where start-ups use the bitcoin blockchain as an alternative rail for transferring money across borders (this business model is described in more detail later in this section).

Bitcoin has also given rise to thousands of new public crypto-currencies, which utilize some variation of the underlying principles of de-centralization in the design of their specific blockchain. While bitcoin (as measured by market cap) continues to be the runaway leader, other notable cryptocurrencies include Ethereum, Litecoin, Dash, Z-Cash, Ripple, and Monero.

Blockchain has also resulted in public and private sector interest in developing blockchains, while foregoing some of the key features of the bitcoin blockchain. Industries as diverse as food, oil, banking, and retail, are all researching the applicability of blockchain. Governments are also considering use cases ranging from land registries to digital-versions of fiat currencies, in addition to considering appropriate regulations vis-à-vis blockchain.

Bitcoin’s growth in public awareness, and rapid adoption for speculative purposes, has been remarkable. At the same time, real world limitations - such as the continued reliance on fragile third party rails, users need to convert to fiat, governance concerns with the centralization of mining power, price volatility, and high energy costs - have significantly diluted or distorted its benefits relative to those originally envisioned as a payment medium in the original white paper.

5.2. What is a Blockchain

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Bitcoin can be considered the first use case of blockchain, the underlying shared ledger technology that allows for decentralized applications. Blockchain has often been described as a shared database. But a better description of blockchain may be as a de-centralized operating system – one that could be utilized for any number of software applications that are already in use today, but could do so without a trusted central party.83

Certainly, one common use case for blockchain has been as a database, where various participants maintain and update the database in a de-centralized and distributed manner. But compared to a database, the real innovation of blockchain technology is in its application beyond databases. It can also set rules about a transaction (business logic). Ethereum, a public blockchain, for example, operates as a de-centralized world computer, where users can execute code to run de-centralized applications on top of the blockchain using the shared computing resources of nodes.

To understand blockchain, the use-case specific features of bitcoin and the generalizable features of blockchain should be separated. While there is still a lack of consensus regarding definitions, and it is difficult to find a common definition of terms, below are several commonly cited features and characteristics and dimensions of what constitutes a blockchain.

<table>
<thead>
<tr>
<th>Blockchain</th>
<th>Bitcoin-Specific</th>
</tr>
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</table>
| • Shared (distributed) ledger  
  o Public or permissioned  
• Consensus mechanism  
• Immutability  
• Provenance  
• Can be designed for different software applications | • Public  
• Proof of work consensus mechanism  
  o Tokenization  
  o Mining  
• Pseudo-anonymous  
• Design for narrow payments use case |

**Shared (Distributed) System**

A software application utilizing a blockchain approach should be de-centralized and

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distributed and synchronized across nodes in a network. This contrasts to the present situation, where IT infrastructure and software applications are centralized. At the heart of blockchain, a shared, distributed ledger with multiple identical copies maintained by all nodes (participants), provides one place to go to determine the ownership of an asset (as in the narrow case of bitcoin), or more broadly, the execution of any piece of code specified in the design of a blockchain.

The information on a blockchain is shared, replicated, and synchronized amongst the members participating in the network. Therefore, blockchain will by definition, involve multiple entities, whether it be market participants in a specific industry, or in the case of a public blockchain, any individual with an interest to participate. Fundamentally, blockchain encourages organizations to collaborate for the benefit of all parties, while putting in place a system to ensure the integrity of the data and activities executed by the parties involved.

Most (although not all) would agree that blockchains can be permissioned or public. A public blockchain is open access such as the bitcoin. Anyone can download the open-sourced software both as a miner (validator), and as a participant in the bitcoin transaction economy. With a permissioned blockchain, participants in the network are designated, with each having a unique identity. For example, in the financial sector, banks may be designated as nodes. This ability to limit the participants of a network to those relevant to the use case is an attractive feature for the private sector.

**Consensus Mechanism**

Entities participating in a blockchain network use a consensus protocol to agree on the content of a ledger and updates to the ledger.84 This replaces the need for a centralized operator. Consensus

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ensures that shared ledgers are exact copies, and in doing so, lowers the risk of fraudulent transactions or activities, because tampering would have to occur across many places at the same time. Proof of Work is the consensus mechanism utilized by bitcoin. It has for many, also become synonymous with blockchain, although this is misleading. This is because consensus mechanisms can be designed in various ways depending on the needs of the particular use case. Several consensus mechanisms are as follows:85

- **Proof of Work:** When participants want to maintain some anonymity (such as in bitcoin), commitment is expensive. Consensus can reached through proof of work. The network challenges every machine that stores a copy of the ledger to solve a complex puzzle based on its version of the ledger. The miner which solves the puzzle wins, and all other machines update their ledgers. Proof of work can be suitable for a public blockchain, such as bitcoin or Ethereum, but it consumes considerable electricity, making it an expensive method to reach consensus. This cost is unnecessary for a private or permission blockchain network where all participants are known.

- **Proof of Stake:** Proof of stake arose in reaction to the electricity-intensive and costly proof of work approach pioneered with the bitcoin blockchain. There is no mining, as all coins are created from day one. Validators of a block of transactions earn transaction fees have a higher chance of mining a block if they hold more of the underlying tokens of the blockchain, and a certain threshold of validators or even a randomly generated group of validators are need to sign off on a block before it is added to the blockchain.

- **Multi Signature:** A simple approach that may be adopted for private and permissioned

85 Ibid.
blockchains where a majority of validators (for example, three out of five) must agree that a transaction is valid.

- **Practical Byzantine Fault Tolerance**: An algorithm designed to settle disputes among computing nodes

There are some politics around whether a private blockchain that does not use proof of work (and mining) can be considered a blockchain at all. Blockchains become more secure with a robust network of multiple nodes involved in ensuring the integrity of the system. But permissioned networks may have small numbers of participants. The implication is that a proof of work consensus mechanism is the main way to ensure true consensus and de-centralization. In its absence, private blockchains may simply be shared ledgers with watered down consensus mechanisms (such as multi-signature). This has given rise to the use of new terms such as “distributed ledger technology” and “blockchain-inspired” in describing initiatives.

**Immutability**

Each block contains a timestamped batch of recent valid activities executed on the blockchain, and is linked to previous blocks. The links between blocks prevent any block from being altered without seriously undermining the entire integrity of the blockchain itself. In doing so, blockchain attempts to attain tamper-resistance by any party, and achieve the key attribute of immutability. If an activity in blockchain is carried out erroneously, that error cannot be erased, but must be reversed in a new transaction that is visible to all participants in the blockchain. In this way, blockchain, in a theoretical sense, more secure.
Provenance

Closely linked to immutability, but with a different emphasis, a blockchain is also characterized by the ability to track the provenance of activities executed on a blockchain. Where immutability focuses on the security features of blockchain, provenance describes how blockchain provides an auditable history of all activities in the network. This feature can be particularly useful in supply chains asset tracking, record keeping, and in payment system applications, such as bitcoin.

Benefits and Drawbacks of Blockchain

It is difficult to generalize about the benefits of blockchain, precisely because the design and features of a blockchain can vary a great deal. Moreover, a blockchain is then applied to a specific use case and live operating environment, under which blockchain’s unique characteristics could be a benefit, or a drawback. For example, immutability, may or may not be a desirable feature, depending upon the use case. Keeping the above in mind, some of the frequently cited benefits and drawbacks of blockchain are as follows:

<table>
<thead>
<tr>
<th>Benefits</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>In theory, blockchain’s de-centralized design and consensus mechanisms may protect against tampering, fraud, and crime. In some cases, this benefit may be diluted in a permissioned network depending on the design of the consensus mechanisms. In other cases, real world behavior may dilute the security benefits, as demonstrated in bitcoin, where users do not purely transact in the safe environment of bitcoin, but commonly use fragile on and off-ramps to fiat currency.</td>
</tr>
<tr>
<td>Auditability</td>
<td>Closely related to blockchain’s provenance feature, a blockchain may allow for improved auditability of data and activities on a particular blockchain. While centralized ledgers are equally auditable, a shared ledger where provenance if built into the design may be an incremental improvement, for actors such as auditors and regulators.</td>
</tr>
<tr>
<td>Cost savings</td>
<td>Various views have been offered for the inherent cost savings built into a blockchain solution. In theory, due to de-centralization, less oversight is needed because the network is self-policing. Depending on the use case, blockchain may also lead to a reduction in the number of intermediaries</td>
</tr>
</tbody>
</table>
participating in a process. The use of shared ledger may also reduce duplication of efforts and related costs.

**Digitization**
Blockchain promotes the digitization of processes and assets, which could lead to operational efficiency, cost savings, and faster processing speeds.

**Multi-Stakeholder Cooperation**
Blockchain, by design, involves multiple market participants. Designing a blockchain is a forcing function to bring market participants to design a mutually optimal solution that may be unachievable by utility maximizing individual participants without an organizing framework. This forcing function may be particularly valuable given the amount of legal IT infrastructure worldwide.

**Enhanced Privacy**
Blockchains can have built in more up-to-date functionalities for data access and privacy. Permissions can be tailored to specific actors, such as regulators, for instance.

**Censorship Resistant**
De-centralization, in the case of open public blockchains, can ensure censorship resistance. While certain countries have banned bitcoin, the de-centralized design of the blockchain limits governments to restricting the on-ramps to bitcoin, without the ability to “close down” bitcoin itself.

Like blockchain’s benefits, its costs are also highly bespoke to the design of a blockchain and its interaction with real world market participants. Below are some of the commonly cited drawbacks to blockchain:

<table>
<thead>
<tr>
<th><strong>Drawbacks</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network speed</strong></td>
<td>Depending upon the design of a blockchain, network speed may be a problem. Bitcoin, designed using proof of work, could only process around seven transactions per second. Ethereum, another proof of work blockchain, has similar scaling issues, given the processing power needed to run full software applications on the blockchain. This may lead to decreases in efficiency relative to centralized designs.</td>
</tr>
<tr>
<td><strong>Transaction costs</strong></td>
<td>Costs of processing on a blockchain may also increase with demand to a level that may work against cost savings, and even dis-incentive utilization of a blockchain. Additional transaction costs are indirect, and may involve the use of on-ramps and off-ramps to a blockchain because of the lack of technical proficiency of certain users.</td>
</tr>
<tr>
<td><strong>Human error</strong></td>
<td>When a blockchain functions as a database, the data must be of high quality. Like any database, if the data going into a blockchain is inherently flawed, it will impact the usefulness of the blockchain. Unlike other databases, blockchain’s immutability feature means that flaws can only be reversed by new transactions on the blockchain; this can be a potentially cumbersome and unnecessary feature.</td>
</tr>
<tr>
<td><strong>Fragility</strong></td>
<td>Blockchains, as a relatively new technological innovation, may run a high risk of breakdowns, tampering, and fraud.</td>
</tr>
<tr>
<td><strong>Censorship Resistant</strong></td>
<td>Because activities on a blockchain can be designed to be in principle, unstoppable, censorship resistance – particularly of public blockchains – is viewed by certain governments as an undesirable trait. The use of bitcoin, for example, for illicit activities, has contributed to this view.</td>
</tr>
</tbody>
</table>
In summary, blockchain remains in the early stages of development as a technology. While a multitude of initiatives are underway, the ultimate adoption of blockchain remains hard to predict. Furthermore, blockchain may be a system well suited for certain use cases, while other forms of systems design and governance may be appropriate for most existing use cases.

5.3. Current Blockchain Remittance Initiatives

5.3.1. Bitcoin Money Transfer Providers

Several start-ups have coalesced around a business model in which money flows are transferred across borders utilizing bitcoin-as-rails. Importantly, the majority of these start ups should be characterized as money transfer providers, without a particular strategic focus on remittances. Some of these start ups are located in sending countries and serve as “on-ramps” for customers (Bitspark in Hong Kong and Veem in the USA are early examples). They accept local fiat currency, convert it into bitcoin on the back-end, before transmitting the funds in bitcoin to “off-ramp” bitcoin remittance providers in receiving countries.

“Off-ramp” bitcoin remittance providers in receiving countries (BitPesa in Africa, Rebit in the Philippines) receive the bitcoin from overseas, and convert the bitcoin into local currency. They proceed to deliver funds to the receiving party through multiple methods, but in particular, through digital channels such as mobile and internet. While variations of the model described above exist, below illustrates the overall concept of the business model.
In the first step in the example above, the sender logs online to the website of the bitcoin remittance provider to set up an online account, which usually requires some type of KYC check common to any remittance provider. After verification, the sender will specify the amount of funds to be sent and information on the recipient. Funds are then debited from the Sender’s bank account at Bank 1 and credited to the bank account of RP A at Bank 2.

In the second step, RP A purchases bitcoin equal to the amount of fiat currency to be remitted (some less user friendly providers may actually require users to purchase bitcoin themselves on a public exchange). Due to the volatility of bitcoin, fiat to bitcoin conversions are usually done on-demand. Thus, RP A must have access to large amounts of bitcoin at low transaction costs depending on the volume it handles. RP A requests a trade with its partner local bitcoin exchange, and instructs Bank 2 to transfer fiat funds to Bank 3. After the bitcoin exchange receives the fiat funds in its account at Bank 3, it proceeds to transfer bitcoin to RP A, thus completing the conversion of fiat into bitcoin. The settlement time of funds between fiat to bitcoin varies.

In the third step, RP A will remit the funds across borders to RP B in the receiving country. We assume that the two bitcoin remittance providers in the sending country (RP A), and the remittance provider in the receiving country (RP B), are part of a negotiated network, so that the
messaging of the funds, and the funds themselves (in bitcoin) can be transferred instantaneously together. Notably, the transfer of funds across the border is executed between two non-bank remittance providers without the need of a correspondent bank. In doing so, the use of bitcoin may increase the speed of the settlement of funds, but only during this cross-border leg in the settlement chain.

After RP B has received the funds in bitcoin, it must undergo a similar process of converting the funds into local fiat currency through a local bitcoin exchange. The settlement time of funds between bitcoin to fiat varies. After this process is completed, the remittance provider can then disburse the funds to the receiver. If the funds transferred are a remittance, and the receiving end user is not technologically sophisticated, the assumption here is that RP B usually will do so through a local agent with an account at a different bank, and the process mirrors that of a traditional remittance provider funds disbursement.

Importantly, in the first and last leg of the service, the customers do not need to know funds were transferred utilizing bitcoin, but only that the service was potentially cheaper and faster than traditional offerings. Furthermore, the volatility risk of currency conversion between fiat and bitcoin is managed by the remittance provider. In this way, bitcoin remittance providers are acting like brokerages, needing to find enough buyers and sellers of bitcoins. Given the extreme volatility of bitcoin daily, having strong FX trading desks and good connection to international exchanges and OTC marketplaces for bitcoin are critical. Bitcoin remittance providers in sender countries which tend to have better banking infrastructure and deeper bitcoin liquidity may have a relatively easier task.

*Business Model’s Relevance to the Cost Drivers of the Remittance Business*

<table>
<thead>
<tr>
<th>Cost Driver</th>
<th>Business Model Impact</th>
</tr>
</thead>
</table>


| “Last Mile” Agent Network Infrastructure | N/A |
| Correspondent Banking Infrastructure | √ |
| Legal and Regulatory Requirements | N/A |
| Lack of Competition | √ |

Under this model, blockchain, and more specifically bitcoin, serves as the replacement for correspondent banking in the cross-border leg of a remittance. According to its proponents, Bitcoin provides an alternative rail that allows non-bank remittance providers to instantly settle in digital currency across country boundaries. It also may increase the speed of settlement, and reduce the number of middlemen involved in the cross-border leg. In corridors where banks are withdrawing from correspondent banking, bitcoin as a rail may be a useful alternative. Yet a closer investigation shows that the benefits of bitcoin utilized as a rail for payments may be exaggerated for now. Even with its benefits at the cross-border leg, the bitcoin model may result in new challenges, which makes the model’s ultimate impact on cost (and speed) inconclusive.

For bitcoin-as-rails to compete with traditional providers on pricing, it must be able to reduce some aspect of the two key components of remittance cost structure: (1) the remittance service fee and/or (2) the hidden foreign exchange rate spread cost. Speed of transaction, which is also considered a potential hidden cost to consumers as it delays the receipt of money (and allows middleman banks to hold “float”), may also be leveraged, although achieving higher speeds of settlement is unlikely to be perceived by customers as a reduction in price.

In regards to the remittance service fee, global average range from 7-8%, but with significant variation corridor by corridor, and remittance providers leveraging bitcoin are increasingly unlikely to be competitive in providing lower rates. That is, unless they position themselves as a relatively cheaper option in the highest priced inefficient corridors globally, or if they simply abandon the remittance market and move upstream to larger size transactions where they can spread their fixed costs more widely.
Firstly, and most concerning for bitcoin remittance providers, the higher cost structure of using bitcoin is being driven by the network transaction fee that is paid to bitcoin miners to ensure that a transaction is included in the next block on the bitcoin ledger has been increasing rapidly, particularly in 2017, driven by increasing transaction volume due to bitcoin’s use as a speculative commodity. This has increased prices from below 50 cents prior to 2017, to above $20 on multiple days in December 2017, according to the data below.

*Bitcoin Average Transaction Fee in USD*

![Graph showing Bitcoin Average Transaction Fee in USD](image)

If one assumes an average remittance ticket size of $200 and a current bitcoin network transaction fee of $20, the transaction fee of alone, if passed on to the consumer, would equate to 10% of the principle of the remittance. Moreover, the bitcoin model gives rise for the need for currency conversion in both the sending country and receiving country. Therefore, a bitcoin remittance provider would need to charge a minimum service fee of 20% - far above the global average of 7-8% - for a $200 remittance without even considering all the other fixed and variable cost related to its business model that should be factored into pricing.

Certainly, various scaling solutions are currently being developed to increase the transaction speed and reduce transaction costs related to the bitcoin blockchain. But given the increasing speculation in bitcoin, these issues are unlikely to be solved in the short term. The practical effect is to make the unit economics of bitcoin remittances untenable for now. Unsurprisingly, as a result,

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there has been a shift amongst some backers of bitcoin money transfer providers that bitcoin may be more suitable for enterprises rather than individual money transfers.\textsuperscript{87}

In regards to savings on the foreign exchange spread, the bitcoin remittance model may not achieve cost savings either. As noted earlier, this model requires currency conversion twice in the process compared to the traditional remittance model. Aside from the network transaction fees, this results in foreign exchange risk at two points in the process, compared to one time in a traditional remittance process. Furthermore, at the time of conversion, the liquidity of bitcoin in a market, along with the associated spread for FX conversion, may also be unpredictable and insufficient.

In regard to the hidden costs of slow processing speeds of some traditional remittance providers, ironically, bitcoin’s slow processing speed has been well documented in recent years, which may dilute the promised real-time transfer of funds, and related benefits for consumers. The chart below shows that in times of high trading volume amongst bitcoin speculators, transaction speeds can spike to over 1,000 minutes. While this confirmation speed is still less than 24 hours, it still dilutes from the promise of instant real-time settlement per bitcoin proponents.

\textit{Average Confirmation Time for Bitcoin Transactions in Minutes}\textsuperscript{88}


Finally, bitcoin remittance cost savings may also face uniquely higher regulatory costs, on top of the already high regulatory costs of engaging in global money transfers. Firstly, many bitcoin startups have had well documented difficulties opening and maintaining relationships with local banks, who may be reluctant to take any compliance risk related to servicing the startup and their customers. Secondly, due to the rapid adoption of bitcoin amongst speculators, tax authorities in a number of countries have designated bitcoin as a commodity or property, with taxation on transaction from bitcoin to fiat, without distinguishing between investment and transaction purposes.

Aside from the cross-border leg, the remaining characteristics of the remittance process involve traditional actors and follow a normal process, with its typical benefits and drawbacks (as described in Section 3). These fixed and variable costs should not be underestimated, given the difficulty of getting scale when targeting small remittance transactions. While detailed cost estimates of existing global incumbents are unavailable, one study has extrapolated from the financial statements of Western Union and other MTOs, concluding that key costs include agency

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commissions, agency start up costs, marketing costs, and licensing and regulatory compliance costs.

In regards to agency commissions were estimated at being potentially between 25-60% of the remittance service fee itself – which suggests that one of the most fundamental cost reductions of new remittance start ups (including, but not limited to, bitcoin-based start ups) is by opting for purely digital channels. But in doing so, they ultimately are serving a very limited segment of the global population of migrants.

As for the regulatory burden in the remittance space faced by start ups, bitcoin remittance providers generally are also classified as money transfer operators, and therefore subject to the same onerous licensing requirements, and ongoing KYC and AML requirements, as any remittance providers, in addition to dealing with any regulatory concerns with the bitcoin-enabled aspects of their business model.

Practically speaking, recent years have seen most bitcoin remittance providers move away from their strategic focus on migrant remittances to larger size small business money transfers or completely different bitcoin based use-cases such as mobile cryptocurrency wallets. A shift to prioritizing small business relationships, and use of digital channels such as mobile, dilutes the bitcoin-aspects of the business model and moves in the direction of other non-blockchain digital first start ups in the cross border transfer space such as Remitly and Transferwise.

The most recent example of a shift away from remittance is Abra. While Abra attempted to create a network of cash-accepting mobile tellers who can help migrants and their families conduct bitcoin-fiat-bitcoin transactions both in the sending and receiving country using Abra’s

90 Development Prospects, 2015.
mobile remittance platform, they have recently abandoned these efforts, and are transitioning to become a mobile cryptocurrency wallet.

Another early pioneer in remittances between Africa and Europe and Asia, BitPesa. In 2014, it claimed to charge a low variable rate of 3% for the remittance service fee (excluding the foreign exchange spread). Since 2017, it has ended its focus on remittance due to many of the factors related unit economics such as the increasing bitcoin network transaction fee, as well as the simple difficulty of scaling and customer acquisition. It has subsequently pivoted to serving small businesses operating across borders.91 In Kenya, they have raised the new minimum limit for transactions to $25,000, well above the average remittance transfer amount. Even with this shift, the company is only generating approximately US $10 million in money transfer flows monthly, and is facing regulatory headwinds, as local banks have been reluctant to open or maintain accounts with bitcoin startups, hindering the on-boarding of new customers.92

An interesting development in the model is that many early bitcoin remittance providers such as Veem no longer utilize bitcoin as the sole means of transferring funds. They now compare and select in real time different transmission models (including through traditional correspondent banking) and the associated costs for a corridor, and decide at the moment of transfer which channel to utilize.

For the time being, bitcoin based money transfer providers remain niche providers, attempting to grab market share in by and large, competitive corridors. Their overall competitive advantages incorporate the use of blockchain, but also go beyond blockchain. Their other

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91 Interview, BitPesa, Zhou Minsi, Head of Product
92 http://bitcoinafrika.io/2017/09/02/bitpesa-secures-additional-funding/
advantages include their integration of digital into their models and their focus on relatively under-targeted client segments such as the small business segment. In doing so, these bitcoin money transfer providers may marginally contribute to competitive pressure on incumbents in the small business money transfer business, but unlikely at the scale or impact commensurate the publicity surrounding their efforts.

Finally, a gap in public perception continues between the perception of these start ups focusing on remittances, and their notable shift towards the small business segment. In many ways, this corroborates the widely held view on the difficulties new start ups have in competing in the remittance space, given the market power of incumbents, amongst other factors. Anecdotally, the pivot away from remittances is due to numerous factors including the costs involved in building out physical agent networks to reach remittance clients, the increasing transaction costs of using the bitcoin network, the volatility and liquidity of bitcoin-fiat pairs, and the high costs of regulatory compliance relative to the size of small dollar migrant remittances.

5.3.2. Blockchain Cross Border Payments Messaging & Settlement System

There has been considerable energy applied by a few start-ups to developing blockchain technology as the backbone of a new cross-border payments messaging and settlement system. Most notable forays in this direction are the start-ups Ripple and to a much lesser extent, Stellar (a spin off from the original Ripple team).
The diagram above describes the original remittance process, prior to any simplifications because of variations to the traditional remittance model. The area highlighted with the red dotted box represents the bank entities involved in the cross-border transfer leg of the remittance process via correspondent banking.

As a refresher, Bank 3 and Bank 6 are the banks of the remittance providers in the sending and receiving country. These tend to be smaller local banks without correspondent relationships with banks in other countries. Bank 4 and Bank 5 are the correspondent banks which Bank 3 and Bank 6 utilize to service the cross-border transaction. Bank 4 and Bank 5 hold correspondent accounts (called nostro and vostro accounts) at each other’s banks, denominated in the foreign country’s currency, as a means of pre-funded liquidity to facilitate cross-border transfers. Put another way, the correspondent banks, for a fee, eliminate the need for smaller banks to maintain accounts in foreign currencies with correspondent banks across the world.

To refresh one’s memory, RP A, on receipt of funds, will request that its bank, Bank 3, transfer funds to Bank 6, the bank of the remittance provider in Country B. As the money moves across borders via Bank 4 and Bank 5, the message request is generally done through the standardized global messaging system SWIFT, of which most banks are members of. The correspondent banks involved in the example, Bank 4 and Bank 5, will have a pre-existing
agreement laying out the fees, hidden foreign exchange rate spreads, and settlement times related to facilitating money transfers through the particular corridor.

Much of the critique of large correspondent banks revolve around the monopoly they have on facilitating cross border money flows. As such, they exercise significant market power in regards to the fees, foreign exchange rates, and settlement times (which generates profit in the form of “float” for these correspondent banks, while also imposing a de-facto cost on recipient of funds due to the time value of money). Additionally, until recently, utilizing the SWIFT infrastructure, a client processing a money transfer through a bank (as opposed to a closed franchise network such as Western Union with better pricing transparency) may not have clarity on the ultimate fees and foreign exchange costs related to the money being sent.

Indeed, many blockchain proponents argue that the various costs generated by correspondent banks could be eliminated if cross border money transfers would simply eliminate the need for these middlemen banks completely. It is exactly this problem, represented by the red box in the diagram above – the cross border messaging and settlement leg – that companies such as Ripple and Stellar aim to improve.

In essence, start ups such as Ripple and Stellar aim to build a better version of SWIFT, the for-profit cooperative which provides the back-end software and common language for banks to securely send electronic messages for cross border payments. SWIFT currently charges banks for using their messaging network, and also sells enterprise software that enables the network. Similarly, in the case of Ripple, the core product is enterprise focused and consists of two parts. First is enterprise software for banks for cross border messaging that enables quicker, more transparency around fees, and cheaper cross border payments than offered through SWIFT. On top of that core product, clients can also choose to integrate with Ripple’s Open-Sourced Interledger
Protocol, which works in tandem with its software to connect ledgers of different types for the purpose of settlement.

Their enterprise software solutions aim to provide better messaging functionality to facilitate the settlement process. Notably, their enterprise solution does not aim to overturn the correspondent banking system, but work within its limitations. For example, where SWIFT provides one-way message services, Ripple has built a two way protocol which can allow for greater transparency. This is because banks can exchange information ahead of time in regards to fees, foreign exchange rates, and estimated time to deliver funds. If any information is wrong or missing, banks can find out prior to funds being sent. These upgrades to enterprise software may ultimately translate into cost savings, although it is unclear how significant they will ultimately be to the end user (relative to the banks involved).

Once the sending bank has initiated a transaction, Ripple uses the Interledger Protocol to settle the funds between various fiat currencies and notify all participants of its successful conclusion. The Protocol aims to have better capabilities in bridging ledgers and currencies to improve the situation related to interoperability. According to Ripple’s internal analysis below, the potential cost savings of banks implementing their enterprise solution is a 33% reduction on the 20.9 basis points global average on payment volume:

*Ripple Analysis of International Cross Border Payment Infrastructure Costs*

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As illustrated in the diagram above, the key to Ripple’s value proposition towards banks is savings in the areas of liquidity, payment operations, and regulatory costs. In regards to liquidity, Ripple predicts that the average “in flight” time for a cross border payment can be reduced and even eliminated (although nostro and vostro accounts still are required). The reduction in time for the cross border payment is also linked to the elimination of Basel III requirements related to cross border transfers. And finally, errors and staff related manual activities will also be reduced as a result of Ripple’s enterprise solution.

The cost savings Ripple assumes will materialize hinge on several factors. For example, the enterprise solution only has value to the extent that a significant number of banks in the world adopt it and utilize it as a standard for communication for cross border messaging. In this regard, network effects are crucial. This is because one of the benefits of Ripple’s system is two way flows of information between banks in a network to allow for more efficient discovery as it relates to fees, FX rates, and settlement times. In this way, the network helps to facilitate the best path for a

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94 Ibid.
cross border transaction for participants in the network. If only a few participants are in the network, the savings for various parties are significantly diluted.

The cost savings in Ripple’s analysis may also be over-stated for correspondent banks for another reason. Ripple claims that the freeing up of idle liquidity within the correspondent banking system can be a significant benefit of their enterprise solution. However, while correspondent banks must cope with the loss of idle capital tied up in nostro and vostro accounts, this is counter-balanced by the slow settlement times (and the profitable “float” it generates) related to holding money that is being transferred across borders. The impact on profitability due to the reduction in float of correspondent banks may be attractive for consumers, but make the business case less attractive to correspondent banks who are critical to adoption of Ripple’s network solution.

In addition to their core enterprise solution software, a more early stage initiative Ripple is advocating is the use of its only digital token XRP, as a rail for certain transfers of actual value.95 Rather than holding correspondent accounts in multiple banks and currencies, banks would simply hold XRP. The aim is to foster XRP as a digital rail and globally accepted currency for settlement, and increase its market cap and liquidity to the extent that market makers will be drawn to XRP fiat pairs.

XRP, as a digital currency, may be an improvement on earlier cryptocurrencies such as bitcoin, because of its ability to handle larger numbers of transaction per second. Certainly, the path to XRP to becoming a global settlement currency is a difficult one. Similar to bitcoin, XRP remains incredibly volatile as a currency influenced by speculators, and therefore would likely lead to higher currency hedging costs. Secondly, XRP’s market capitalization, which as of December 2016 hovered around USD $25 billion, is not large enough by any means to constitute

95 Ibid.
a liquid market to be utilized as a global rail for the trillion plus dollar cross border transfer market.96

Naturally, SWIFT, as the incumbent, has a competing initiative to upgrade their messaging service. The initiative, named Global Payments Innovation, promises some of the same upgrades in terms of transparency, speed, efficiency, and liquidity management, that Ripple’s solution claims. SWIFT, with its 8,000 banking members, is also in an advantageous position, relative to Ripple, which faces a tremendous uphill battle in building a consortium of banks on its platform solution. Regardless, Ripple may be one of the only credible competitors to SWIFT as the back-end infrastructure for correspondent banking, since its inception in the 1970s.

In totality, Ripple’s overall offerings continue to evolve and expand. Moreover, there remain plenty of hurdles – particularly on the regulatory and security side - left to clear before the adoption of an alternative to a tried and true method such as SWIFT. But Ripple and Stellar stand out as attempt to use blockchain as impetus towards better interoperability, collaboration, and transparency in handling of cross border payments.

Returning to Ripple’s impact on the remittance use case, it is clear that Ripple’s business model will primarily impact large ticket size business-to-business cross border transfer volume, which accounts for the majority of the cross border transfer market. However, and importantly, these cost savings, even if they trickle down to the niche market of remittances, will likely flow mainly to the banks that act as the back end infrastructure of correspondent banking, in the form of freed up liquidity. For remittance providers themselves, there may be some trickle down benefits in regards to messaging fees for remittances, and faster settlement times, but the impact on costs

may be more muted relative to larger ticket size money transfers, due to small ticket size of remittances.

Business Model’s Relevance to the Cost Drivers of the Remittance Business

<table>
<thead>
<tr>
<th>Cost Driver</th>
<th>Business Model Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Last Mile” Agent Network Infrastructure</td>
<td>N/A</td>
</tr>
<tr>
<td>Correspondent Banking Infrastructure</td>
<td>✓</td>
</tr>
<tr>
<td>Legal and Regulatory Requirements</td>
<td>N/A</td>
</tr>
<tr>
<td>Lack of Competition</td>
<td>✓</td>
</tr>
</tbody>
</table>

Moreover, many of the fundamental cost drivers related to remittances remain unaddressed with the sole focus on correspondent banking, and providing a competitor to SWIFT. Currently Ripple remains cash flow positive, in large part due to the continued appreciation of XRP, which has enjoyed an exponential increase in price, riding the wave of speculative interest in cryptocurrencies.\(^\text{97}\) While this has allowed Ripple to maintain cash flow positive, the currency volatility also works against XRP’s adoption as a global settlement currency.

Yet Ripple has had limited success getting widespread adoption of its solution. Over 75 banks have deployed Ripple, which is commendable given the inertia favoring SWIFT, but certainly a long way from universal adoption.\(^\text{98}\) Yet some of the largest players remain on the sidelines. As explained earlier, large correspondent banks also are some of the biggest beneficiaries of the inefficiencies in the correspondent banking system. And benefits to the sector broadly may not dovetail with the individual incentives of these correspondent banks, not to mention the high hurdle for overhauling back-end infrastructure in general.

6. Conclusions


These early experiments applying blockchain to the remittance market reveal the gap between the theoretical benefits of blockchain and the actual benefits of blockchain in a complex operating environment. Both remittance business models described in this research reveal the challenges of executing blockchain based plays, namely the difficulty in gaining adoption due to the higher levels of regulatory scrutiny and the difficulties of pushing adoption of new, untested technology.

The bitcoin remittance provider model uniquely highlights the risks of leveraging upon public de-centralized infrastructure (such as bitcoin). As an open source project, bitcoin is being utilized for multiple use cases, and the global speculative frenzy has had the unintended consequence of raising network transaction fees, which dilutes the cost savings case for utilizing bitcoin for money transfers. Moreover, it is unclear that these early bitcoin based remittance providers will even survive in their new incarnations. Targeting small business cross border transfers constitutes a small volume of global transfer volume, and therefore faces the same scale issues and unit economic challenges facing remittance startups in general.

More broadly beyond the blockchain space, remittance start-ups focusing on digital channels will only be able to continue their expansion in limited markets with robust digitally native populations. In the long run, underlying behavior change of clients towards a greater acceptance and facility with digital banking could tip the scales in favor of some of these digitally native money transfer start-ups who have built up a reputation for trust and competence, such as TransferWise and Remitly. At that inflection point, Western Union’s large physical infrastructure will finally become a liability in any fundamental pivot to digital. However, the lack of such markets with digitally savvy lower income populations means that scale will come slowly for now. In the meantime, these money transfer startups will continue to focus on higher income customers.
In the short to medium term, large scale disruption in remittances is more likely to originate from players (not necessarily start-ups) who can accelerate the transition of remittance clients to digital means. In doing so, they address a much larger market than mobile first plays while offering the same price advantages relative to pure bricks and mortars players. A recent example of such a latent disruption originates from the potential acquisition of Moneygram by Alibaba affiliated Ant Finance. Ant Finance may be well suited to re-imagine Moneygram’s bricks and mortars model for a digital age, and capitalize on its significant customer base of remittance clients. This is because Ant Finance has in the Chinese context, a proven track record of transitioning a large population, many of them digitally un-savvy (such as the elderly) into using a digital platform for financial services.

In contrast, startups such as Ripple which ambitiously attempt to overhaul the cross border payments messaging and settlement system highlight the challenges surrounding collective action that is likely to be common in many blockchain-based plays across multiple industries. Encouraging collective switching to new blockchain solutions will require patience, and will have a high probability for a binary outcome of success or failure. Regardless of whether blockchain is ultimately adopted in the cross-border payments space, it has provided an opportunity for existing players involved in correspondent banking to take a critical look at existing processes and infrastructure. The same is likely true in other industries in which blockchain has had the effect of providing new pressure for market participants to overhaul legacy infrastructure.

These nascent blockchain based efforts in the cross border payments space have also revealed the difficulty of realizing blockchain’s myriad benefits in a theoretical sense – security, speed, de-centralization, lower costs – when the technology is put into a real world operating environment. Put simply, blockchain’s promise as a technology can easily be distorted when
grafted onto a practical use cases. Real world constraints and market participant behavior will continue to limit the potential of the technology.

Moreover, in the years to come, regulatory measures in the financial sphere will likely increase, and cause heightened scrutiny and potentially unintended consequences to business models (including remittance plays) that may leverage upon public cryptocurrency blockchains. Beyond the financial services sphere, various media reports suggest increasing activity to define policy and regulation related to blockchain in areas such as consumer protection and privacy. At the same time, countries are also considering the development of country-wide, regional, and global standards related to blockchain interoperability that may have far-reaching implications for initiatives in the blockchain space.
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