Economics beyond Financial Intermediation

Digital currencies’ possibilities for growth, poverty alleviation and international development

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Abstract

Bitcoin is a technology that allows for global payment without financial intermediation—an innovation with significant transformative potential for the global economy. Bitcoin is the first technology for the final transfer of digital goods online. The operation of bitcoin is based on a distributed, decentralized, and transparent asset ledger, The Blockchain, which is an ongoing chain record of all transactions. The transaction record itself is divided into coins which can be traded on the network, and whose issuance goes to rewards those who contribute processing power to the operation of the network. The issuance of new coins is entirely predictable and programmed into the bitcoin algorithm. The possibilities created by this innovation are most significant for the world’s poor—billions of people who remain to this day largely without access to financial services, and who could skip traditional financial services and move to digital currencies in the same way they have gone straight to using mobile phones and skipped telephone landlines. This paper offers a preliminary exploration of digital currencies’ possibilities for development, particularly in the areas of remittances, microfinance, development aid, international trade, capital accumulation, and international supra-legal contracts.

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I. Introduction

At the beginning of the twenty-first century, the telecommunication revolution has improved virtually all aspects of modern economic life. Email has vastly increased the ability to communicate information across the world, compared to paper mail and the telegram. Websites like Amazon and Ebay have given consumers an infinitely wider array of products and producers, while allowing producers to extend their reach to large numbers of consumers. Global Positioning Satellite systems have made driving and navigation safer and easier. Various fields of industry and agriculture have benefitted from the innovations that better communication and efficient production chain management have produced. Search engines have made information accessible worldwide in a manner heretofore unimaginable. Many more global transformative innovations can be listed, yet there remains one field where the internet has hardly made any impact, and where business continues as it has done for decades, and that is finance and banking.

As the former chairman of the US Federal Reserve System Paul Volcker famously put it, the “single most important” innovation the financial industry has witnessed in the past 25 years was the introduction of Automated Teller Machines. “I wish someone would give me one shred of neutral evidence that financial innovation has led to economic growth.” While banks have produced various new financial instruments and methods of hedging risk and maximizing their profitability, the banking experience for the consumer has largely remained unchanged since the ATM allowed withdrawals outside bank branch locations and opening hours. Most significantly: transferring money across bank accounts continues to cost dozens of US dollars per transaction, and takes days to complete.

These high transaction costs constitute a small problem for the populations of rich industrial nations, but they are an insurmountable obstacle for much of the world’s poor, who do not present an attractive market for financial institutions, and thus remain largely unbanked and unable to access financial services altogether. When they must use financial services for remittances, the fees they pay are exorbitantly high compared to the small amounts transferred.

Banking has not improved the speed and cost of transactions because of a dual logistical-political problem: Any transaction not carried out with cash in person has to rely on third-party intermediation to prevent double spending; i.e. to ensure that the payer does have the funds necessary for the payment, and that they are not making other payments that exceed these funds. Two parties cannot perform a financial transaction between their accounts without the custodian of the payer’s account verifying that the sender has sufficient funds to perform the transaction. With the political and economic importance of financial intermediation, this role has been regulated by governments, limiting entry and exit, and isolating intermediaries from true free market competition that would weed out the inefficient and only allow the productive to survive. Capture of the regulatory agencies by the regulated parties has protected their rents by preventing market competition from

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2 The Automated Teller Machine was actually invented in 1969.
more rapidly advancing the interests of the transacting parties. The result is that even as telecommunication technology has advanced, transaction costs have remained high, and modern financial innovation has not overcome this logistical and political obstacle. That changed in the year 2008, when a pseudonymously published 9-page paper contained the first workable design of a payment system technology that completely avoids third-party intermediation: Bitcoin.

II. What is bitcoin?

Bitcoin is a network that allows for digital payment between its members without third-party intermediation. Payment is irreversible, initiated by the payer, and virtually costless and instantaneous. This paper will take a functional approach to the understanding of Bitcoin; its features and constituent parts can be expressed in terms of four distinct technologies: a technology for the transfer of digital goods, a common asset ledger (the Blockchain), a hyper-deflationary currency, and a technology for implementing ‘Smart contracts’. This section overviews the basics of all four technologies.

1. Transfer of digital ‘goods’

The groundbreaking innovation of bitcoin is that it is the first technology for the transfer of actual digital “goods” from one location to the other. Since the inception of computer networks, it has been possible to send digital data and objects between computers, but such a ‘transfer’ actually only sends a copy of the data to the recipient, maintaining the original with the sender. By offering the possibility of reliable irreversible transfers of digital goods that leave no trace with the sender, Bitcoin solves the double-spending problem and makes payment without intermediation possible.

As such, bitcoin is the world’s first instance of digital cash, transferring all the properties of paper cash to the digital realm. Bitcoin payments are irreversible and need no intermediation just like personal cash transactions, but are not restricted by limitations of physical time and space, since payment can be made instantaneously across the world to any device with an internet connection. As such, Bitcoin can be understood as being to currency what email is to paper mail: an infinitely faster and cheaper digital shortcut for a physical world activity that has been carried out for millennia.

Bitcoin allows for the transfer of digital goods without intermediation by maintaining the full record of ownership and transactions in a transparent distributed asset ledger shared by all computers on the decentralized peer-to-peer network. This record is named The Blockchain.
2. **The Blockchain**

Technically, bitcoin is an algorithm that records an ongoing chain of transactions between members of a decentralized peer-to-peer network, and broadcasts these records to all members of the network. There is no central intermediary to record transactions—all network members record them, and all members spend computer power verifying them and inscribing them into blocks. Processing power needs to be expended by these computers to perform mathematical operations to timestamp and validate the transactions.

New transactions continue to be written into new blocks, added to the previous blocks, forming The Blockchain: a common transparent, global, and openly-accessible asset ledger. The definitive and accurate record of transactions is the one on which most CPU (Central Processing Unit) power has been expended to verify transactions. The use of expended CPU as verification protects The Blockchain from manipulation by network members. Should a member of the network attempt to falsify the common record, they would need to marshal more than 50% of the total processing power of the network to validate their forgery. Without the majority of processing power, the transaction would simply be discarded by the network, ensuring only valid transactions are recorded onto The Blockchain.

When a member of the network expends processing power validating transactions, it groups them into a new block, which it transmits to all other members. As reward for expending this processing power on validating transactions, the network member receives new Bitcoins—the currency unit in which transactions are recorded. This process is referred to as the mining of bitcoins, as it is the only way in which new coins come into circulation.

3. **The Currency**

Thus, the Bitcoin currency itself is made up of the chain of recorded transactions between members. A useful metaphor from the physical world is to imagine that a currency develops out of actual account books containing a record of transactions. The effort (CPU power) expended on verifying the online record of transactions ensures these records are accurate, which in turn makes the record book a valuable tool for any computer that would want to utilize the technology of payment without intermediation. The ownership of the record books is recorded, and the record books themselves become the currency. As more transactions are carried out, more CPU power is expended on verifying these transactions, creating blocks of transactions to be added onto the Blockchain, and with each new block, new coins are created. Thus, the supply of coins is increased to reward members who expend CPU power on validating and maintaining the network. In economic terms, the network offers positive incentives for its own maintenance, as ‘seniorage’ goes to those who expend resources running and maintaining it.

A new block of verified transactions is produced every ten minutes. At the inception of the currency, each new block contained 50 new bitcoins, and this rate continued through the first four years, until the end of 2012. The reward for each block was then halved to 25 bitcoins, and will continue at this rate for four years, after which
it will be halved again. This process of ‘halving’ bitcoin rewards every four years will continue, and with it the bitcoin supply will grow, but at a steadily decreasing rate, asymptotically approaching 21 million bitcoins.

The bigger the network and the higher the number of transactions, the more mathematical work needs to be done to verify transactions, and the more CPU is needed to earn bitcoin rewards. On the other hand, as the network size grows and the adoption of the currency increases, its real-world purchasing power also increases, thus ensuring that the block mining reward, while constant in terms of Bitcoin, and costing more in terms of CPU, is worth more in terms of real goods and services. This is the most strikingly ingenious facet of the design of Bitcoin: If the network grows, the rise in the purchasing power of the currency ensures that the reward to the computers that run the network is increased, thus incentivizing ever-more processing power to be dedicated to verifying the network. The programmed decreasing rate of increase of coin issuance, combined with the fast growth of the network ensures that miners who operate the network continue to be rewarded for running it.

By April 2014, more than 12.5 million bitcoins (60% of the total supply) have already been mined into circulation, leaving less than 9 million to be mined over the coming decades. We can thus understand the bitcoin currency as a currency with no central bank, where the traditional tasks of the central bank are controlled by a distributed mathematical set of rules.

First, currency issuance is not handled by a central bank and human discretion, but according to the pre-programmed distributed protocol, at a predetermined and entirely predictable rate of increase. Secondly, the intermediation of payments is also not handled by a central bank, but by the collective effort of the members of the network, who expend computer processing power on this task. Thirdly, the seniorage from the issuance of the currency does not go to the government or to generate credit, but to the computers that spend processing power on maintaining the network and running transactions.

The uniqueness of the bitcoin idea is that it uses the seniorage from currency issuance to reward the expenditure of CPU on validating transactions— or generating the blockchain. In other words, new coins are offered to those who maintain the Blockchain.

The more users adopt bitcoin for purchases and payments, the higher the demand for the currency, the higher its real purchasing power in goods and services, the more valuable the reward for expending CPU on validating transactions, the larger the incentive to expend CPU on maintaining the network, ensuring it continues to run smoothly as the volume of transactions increases. There is also a very small transaction fee that rewards CPU expenditure on network maintenance and transaction verification.
Bitcoin can thus be understood as a hyper-deflationary currency. The network grows as fast as bitcoin adoption rises, or, in other words, as fast as the bitcoin economy grows; the issuance of the currency, however, only rises at a predetermined rate, which is quickly dropping. Though the supply of the currency is increasing, and will continue to do so for more than a century, the real purchasing power of the currency has increased drastically in the five years it has been circulating. The increase in adoption explains the meteoric rise in the purchasing power of bitcoins since circulation started in 2009. The first recorded exchange rate of bitcoins for fiat currency was at a rate of 1,309.3BTC for 1USD, offered in October 2009. By April 2014, the exchange rate had risen to fluctuate around 0.002BTC for 1USD, reflecting roughly a six-hundred-thousand-fold (or 60,000,000%) increase in the price of a bitcoin in US dollars in four and a half years. Thus, the bitcoin currency can best be understood as a hyper-deflationary currency. The strictly limited amount of currency available means that the more the technology of bitcoin catches on, the higher the purchasing power of the currency rises. It is this deflationary rise in the value of bitcoin that provides a very strong incentive for the maintenance of the network, and incentivizes more and more people to purchase bitcoins and accept them for payment.
The hyper-deflationary design of the bitcoin currency is the main way in which it differs from traditional currencies circulating today. In modern economies, central banks are tasked with ensuring the money supply expands at a controlled low pace, to allow economic growth without deflationary rise in the purchasing power of money. The standard economic textbook argues that this mild inflation is necessary to stimulate spending and investment and discourage hoarding. Bitcoin, on the other hand, is influenced by the Austrian School of Economics, which sees that the money that emerges in a market as the most marketable commodity and most saleable asset; the one asset whose holders can sell with the most ease, in favorable conditions. An asset that holds its value is preferable to an asset that loses value, and investors who would want to choose a medium of exchange will naturally all gravitate towards assets that hold value over time as monetary assets. Network effects mean that eventually only one, or a few, assets can emerge as media of exchange.

According to Austrian theory a money that appreciates in value allows individuals to save for the future, and watch their savings gain purchasing power. Equivalently, it encourages deferred consumption, resulting in lower time preferences. Further, an economy with a negative inflation rate would witness investment only in projects which offer a positive real return over the rate of appreciation of money. By contrast, an economy with a positive inflation rate would witness investment in projects that offer positive returns over depreciating currency, but negative real returns. These projects effectively destroy society’s capital stock, but are a nonetheless rational alternative for investors since they do not depreciate as fast as the currency. These investments are what Friedrich Hayek terms *malinvestments*: investments only undertaken because of the decrease in the purchasing power of the currency.

Bitcoin exists as a real-world experiment in this inflation/deflation debate. Whereas traditional currencies usually have positive inflation rates, continuously increasing in supply and decreasing in purchasing power, bitcoin has so far witnessed highly negative deflation rate in terms of real purchasing power. If Bitcoin is considered as another currency and its inflation rate measured with respect to the US Dollar, it would be highly
negative, as shown in the data below, averaging a -85% inflation rate in the three years for which data is available.

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<th>BTC/USD</th>
<th>Inflation rate</th>
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<td></td>
</tr>
<tr>
<td>DEC 31 2011</td>
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</tr>
<tr>
<td>DEC 31 2012</td>
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<tr>
<td>DEC 31 2013</td>
<td>0.00</td>
<td>-98.32</td>
</tr>
</tbody>
</table>

If one were to perform the reverse experiment, and analyze the performance of the USD from the perspective of the bitcoin economy, it would appear as a hyper-inflationary currency, inflating at an annual rate of 2,500% over the past three years.

<table>
<thead>
<tr>
<th>DATE</th>
<th>USD/BTC</th>
<th>Inflation rate</th>
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<tbody>
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<td></td>
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<tr>
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<tr>
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</tr>
<tr>
<td>DEC 31 2013</td>
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If the rate of bitcoin adoption grows, the currency is likely to become more and more deflationary—its purchasing power would increase. If, on the other hand, bitcoin adoption stalls or falters, the purchasing power of bitcoin could drop.

4. Smart Contracts

The bitcoin blockchain allows for many applications beyond just bitcoin the currency. Blocks can also contain publicly accessible or encrypted text and computer code, offering many potential applications which users have only just begun to explore. As a publicly accessible, transparent and open ledger, the blockchain can be transcribed with what Nick Szabo calls ‘Smart Contracts’—contracts which are transcribed in actionable computer code that makes them self-enforcing or self-executing, obviating the need for third-party enforcement. Such software can transparently and accurately assess compliance with contract terms, and based on it, carry out financial transactions in the bitcoin currency, or control electronic devices, grant access to texts, execute wills, and so on. Ethereum is a new project which aims to create a cryptographic ledger that allows participants to encode arbitrarily complex contracts, autonomous agents and relationships that will be mediated entirely by the blockchain.3

3 https://www.ethereum.org/
At its heart, what the bitcoin blockchain allows is the restructuring of various forms of human relationships based on transparent mutual consent, without the need for trust, or enforcement. As such, complete strangers can enter into binding agreements, trades and employment with one another knowing that the tamper-proof blockchain can reliably enforce the terms of the contract. This expands the possibilities for consensual agreements and curtails the need for coercion and the threat of coercion as enforcement and intermediation mechanisms.

III. The strength and resilience of bitcoin

In little more than 5 years in existence, bitcoin has gone from being a computer program installed on two computers sending digital coins with no real purchasing power in the real world, to a global algorithm installed on a large number of computers worldwide, with the digital currency supply exceeding $5b in market value, and accepted by thousands of merchants worldwide. All of this was achieved through voluntary cooperation of strangers the world over. During this time, not a single attack or threat has succeeded in destroying the network. There are three main aspects of the design of bitcoin that make it resilient, and these are: the enormous processing power behind it, the absence of a single point of failure to the system, and the fact that participation in the network is entirely voluntary.

1. Processing power

As a result of the lucrative rewards for maintaining it, the bitcoin network has grown into what is by far the world’s largest supercomputer. In November 2013, the processing power dedicated to bitcoin was estimated at around 64,000 PetaFlops. By contrast, the world’s fastest supercomputer, Tianhe-2, has a speed of 33.86 PetaFlops. The world’s top 500 supercomputers combined have a processing power of ‘only’ 250 PetaFlops. In other words, the combined processing power of the global distributed network of computers validating bitcoin transactions is more than 250 times larger than the processing power of the world’s top 500 supercomputers combined. This system is perfectly incentive-compatible to ensure the continued smooth operation of the network: As more people demand bitcoins for financial transactions, the purchasing power of bitcoins

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increases, and with it increases the real value of the reward for expending processing power on validating transactions, ensuring more processing power is dedicated to run the network.

2. **No single point of failure**

The lack of a centralized authority to issue bitcoins and monitor transactions is the chief strength of bitcoin. Not having a central server that processes all transactions means that the system has no single point of failure, making it extremely resilient to attack or technical failure, if not impervious to them. A physical or digital attack that destroys any individual computers operating the network would not make a dent in the operation of the bitcoin digital transfer technology, currency, or blockchain. Such an attack could destroy a fraction of the processing power behind bitcoin, but would leave the bitcoin blockchain intact as a ledger of assets and record of transactions. This might hurt the individual owners of these computers, but will have no impact on the integrity of the bitcoin algorithm or the currency. No matter how many computers on the network are attacked and destroyed, the blockchain can continue to live on the remaining computers. So long as two computers can continue to communicate with one another anywhere in the world, the blockchain can survive as a record of all transactions and coin ownership.

Bitcoin is an embodiment of Friedrich Hayek's concept of distributed knowledge and complex spontaneous order emerging from simple individual actions. Hayek's work was the inspiration behind Wikipedia, the online encyclopedia whose strength is that it does not rely on centralized authority, but on distributed knowledge. This makes Wikipedia resilient, specialized, up-to-date and immensely cheap to operate and access, in a way incomparable to any encyclopedia compiled by a centralized authority. Similarly, decentralizing the blockchain as a record of transactions, and verifying it with the distributed processing power of the network ensures a far cheaper, faster, and more resilient method of payment than any technology reliant on a centralized intermediary.

This simple algorithm designed by an anonymous programmer has evolved steadily over the past five years, been adapted into various other uses by individuals and groups that an entirely new ecosystem has emerged from it, and will likely continue to evolve.

3. **Voluntary**

The existence and operation of the bitcoin network is entirely consensual: all the people who have traded bitcoins for goods, services, or other currencies, and all the people who have dedicated hardware processing power towards the maintenance of the network have done so out of their own accord. Any person who does not like the idea, for whatever reason, can completely isolate themselves from it and suffer no adverse consequences from it. Any person who chooses to utilize the bitcoin technology accepts the risks associated with it. In contrast, the legacy fiat currencies and financial system expose holders to risks in which they do not partake and for which they did not consent. Banking failures through contagion or liquidity shortages, as well as currency devaluation for political purposes, are prime examples of phenomena that cannot, by design,
happen in bitcoin. Good algorithm design combined with the transparency of open-source software and reliability of large decentralized networks can substitute for politicized and centralized institutions, and may prove more reliable.

This consensual and distributed nature of bitcoin appears to make it immune to political pressure or sanction. Janet Yellen, the current chair of the US Federal Reserve Board has indicated that it is not possible for the FRB to regulate bitcoin. While several central banks have issued warnings against its use, there is practically nothing that can be done to actually stop or ban its use. Any person with an internet connection can access any one of the many sites or services that utilize bitcoins. The only practicable way in which governments can stop bitcoin adoption is by banning regulated financial institutions from using it, but that is largely immaterial to bitcoin, which essentially eliminates intermediation and replaces the entirety of modern financial institutions with faster, cheaper, safer, and more efficient computer code. Such a ban is akin to a government banning the national postal service from using email; it might hamper the operation of the national postal service, but is unlikely to cause any serious problems for the technology of email.

It thus seems bitcoin is extremely resilient to attack, whether by vandals, hackers, or government agencies. Bitcoin might even be termed anti-fragile to these attacks, since all such attacks have failed at killing it, and in fact seem to have only made it stronger, and more resilient to future attacks. Countless hacking attempts have failed, but many of them have exposed weaknesses in the code, and forced the operators of the network to revise it to make it more resilient. Government attacks, on the other hand, seem to have only succeeded in raising awareness of bitcoin and exposing its idea to wider audiences, fueling the growth of the network.

IV. Other digital currencies

Perhaps the biggest threat to bitcoin is from other digital currencies, or Altcoins, as they are known. Hundreds of Altcoins have been introduced since the inception of bitcoin, copying the same basic idea, with varying differences in features and implementation. Zerocoin, for instance, promises complete anonymity; Litecoin promises faster transaction processing, and Peercoin claims to distribute new coins according to usage of the coins, rather than processing power accumulation, supposedly allowing for less wealth accumulation among the early adopters. Peercoin is also programmed to continue to increase in supply at a rate of 1% a year indefinitely. These coins have coexisted next to bitcoin so far, but have remained a tiny sliver of the size of the bitcoin network in terms of market cap and processing power. It is not inconceivable that one of these coins could supplant bitcoin as the leading digital currency, but there are three main impediments to this happening. The first is the first-mover advantage: As bitcoin is the first digital currency, its reputation and name recognition is far greater than all altcoins, and it is likely to continue to grow faster than the others by attracting more of the new users of digital currencies. A large infrastructure of services, such as exchanges, online wallets, and merchant facilitators, has developed around bitcoin, and not around the other coins.
Secondly, network effects mean that bitcoin remains far more useful as an actual currency and medium of payment, since far more people are already using it as a medium of payment, while Altcoins are mainly a vehicle for speculation. Merchants and businesses which want to venture into digital currencies are far more likely to accept bitcoin for payment since it opens up a far larger network of potential customers than any altcoin. Third, and perhaps most important, is the aforementioned processing power behind bitcoin, which is far larger than any other currency, making it far more resilient to attacks than the other altcoins. All three of these reasons make it likely that bitcoin will remain the leading digital currency for the foreseeable future, though the opposite conclusion cannot be discounted. Altcoins will continue to be the testing ground for new innovations in the technology of digital currency, and it is impossible to foresee today how these innovations will play out. Given the aforementioned strength of bitcoin, however, what is more likely than a new digital currency supplanting bitcoin is the prospect of new innovation built on the bitcoin network itself, with various types of currencies and financial instruments layered on top of the bitcoin blockchain.

Yet such a question is not significant for this paper’s purposes, as the technology behind bitcoin is far more interesting than bitcoin itself. Whether the current bitcoin network is usurped by another digital currency with some superior features, or should it fail due to some unforeseen problem, we will still be left with the immensely useful and cost-effective technology of open-source distributed decentralized transparent asset ledgers allowing for financial transfers without third-party intermediation. This technology cannot be uninvented, and can find more and wider applications across various economic, legal, technical and political avenues. It is this technology, more than bitcoin itself, that is what is most interesting. After all, the technology behind search engines revolutionized the world, irrespective of the fate of the web’s first search engine, Altavista, which has now gone out of business.

V. Bitcoin and development

Bitcoin offers the most promise and potential to the billions of people who to this day remain unbanked and unable to access financial services. The high cost of financial intermediation makes the world’s poor unattractive to financial institutions; the small market value of transactions means that the small fees charged on them cannot cover the costs of intermediation. Further, in developing countries where political instability is higher, financial institutions face difficulties in operating that reduce their services and reach. The developing world is well behind the developed world in terms of financial development, and would require extensive investment in infrastructure, education, training and capital accumulation to be able to catch up. But bitcoin offers the intriguing possibility that developing countries could sidestep the development of a traditional financial system and move to mass adoption of international online digital currency. Many developing countries also have underdeveloped telecommunication networks and very little telephone
penetration, but the invention of the mobile phone has allowed for the spread of telecommunication without the need for large infrastructure spending.

1- Remittances

The market most ripe for disruption by digital currency is that of international remittances. The World Bank estimates global remittances in the year 2013 at $400b. At the end of 2013, the average cost of remittances is 8.58% of the amount of money transferred, with bank transfers costing an average of 12.33%, money transfer operators 7.01%, and post office transfers costing 4.12%.

Sub-Saharan Africa is the region with the highest average cost of remittances, which is 12.55%. After all the recent advances in communication and transportation technology, this is an anachronistically and astonishingly high ratio. The lack of penetration of traditional banking into Sub-Saharan Africa is arguably the culprit here, as is the inability of new players to enter the money transfer business due to heavy government regulation.
Bitcoin can affect remittances in two manners: First, it can be used for direct person to person transfers, which would be virtually costless and instantaneous. The problem with this method, however, is that bitcoin is not adopted widely enough for recipients to be able to spend it in place of their traditional currencies, at least for the time being. A Sub-Saharan African family receiving bitcoins today on a mobile device would find it hard to spend that money on meeting their actual expenditure needs.

The second entry point for bitcoin into the remittances industry is through money transfer agencies adopting bitcoin for their transfers, while paying out currency in cash. Kenya has already witnessed the emergence of the first such company, BitPesa, which currently charges only 3% and guarantees same-day delivery. BitPesa receives bitcoin from expats all over the world and pays out their equivalent in local currency to Kenyans, in cash in person, via a domestic bank transfer, or through Kenyan mobile payment system M-Pesa.

If bitcoin adoption continues to grow, that would likely be beneficial to services like BitPesa in the medium-run, as more expats would be willing to buy bitcoin and send it to BitPesa. In the long-run, however, bitcoin growth would likely undercut services like BitPesa by making it more likely for individuals to transfer bitcoin directly to each other.
Nowhere does the possibility of costless international cash transfers have more transformative promise than the area of microfinance, where transaction costs have the highest toll on the poor, and their elimination opens wide vistas of possibilities for international financing.

With bitcoin, individuals in rich countries can make small transfers to individuals in poor countries and receive quick repayment. A quantity of money that would be trivial for an individual in a rich country could be life-altering to an individual in a developing country. This transfer today would not be a possibility since making the loan and each repayment would involve a large transaction fee, on the same order of scale as the payment itself. It is not feasible for an individual in a rich country to make a direct loan of $100 and get repayment in 12 installments if each of these 13 transactions would cost $20-40, as they do today. But if the transaction cost is eliminated, such loans become a distinct possibility, and a new world of international peer-to-peer microfinance could emerge.

Individuals in rich countries are likely to charge interest rates that are far lower than what the borrowers could get from local shark lenders or financial institutions. International zero-interest loans could become widely-available for individuals in poor countries. An online rating system for borrowers’ repayment reliability could emerge, which would provide strong incentives for repayment.
As bitcoin adoption spreads, such lending could be integrated into the business model of borrowers, who can receive their own payments in bitcoin, making accounting completely transparent and repayment automatic. With the drastic reduction of transaction costs and risk of repayment, microfinance is likely to shift from lending to direct equity investment that shares in profits and losses.

3- Development aid

The reduction of transaction costs on international transfers can have an impact on development aid similar to that in microfinance. Individual peer-to-peer donations can reduce overhead and waste significantly.

Natural disasters can severely damage the financial infrastructure of an area, posing severe challenges to mobilization of resources for relief efforts. Digital currencies can transform disaster relief by allowing for donations from around the globe to go to the stricken areas immediately when they are most needed. Resources and relief efforts can be mobilized far faster when those afflicted by disaster have the financial ability to pay for them directly.

4- International trade

The biggest impediment to the globalization of trade is no longer shipping or information, but payment. Shipping and mail services are continuously getting cheaper and more widespread. The internet has made information on products accessible worldwide. But payment remains more complicated, especially in developing countries. Digital currency’s potential is to be the great leveler of international trade, allowing producers and suppliers the world over to compete for a global marketplace, and to compete purely on the quality of their goods, rather than their access to finance.

5- Capital accumulation

The deflationary nature of the Bitcoin currency makes it appealing as an inflation haven. Currency devaluation, hyperinflation, banking failures, liquidity crises, and bank account confiscations are frequent events in many developing country, as financial history books attest. The rapid rise in the value of bitcoins over the past five years makes it a potential haven for citizens of countries whose currencies are devaluing, which might result in a further drop in the value of the domestic currency. While this could theoretically lead to a hyperinflationary collapse, a more likely immediate consequence is that the threat of exit to bitcoin could force governments to act with more monetary responsibility in the inflation of their currencies.

The world’s poorest are usually citizens of countries that continuously witness devaluation of the value of their currency. Should the world’s poor begin to transact and accumulate savings in an appreciating currency, they would be able to accumulate capital far more effectively. With increased savings, investments, and the attached increase in the marginal product of labor, escape from the trap of poverty becomes more likely.

6- International supra-legal contracts
The economic development literature outlines the importance of institutions to the process of economic growth and development. Security of property rights, enforcement of contracts, and efficiency of the judiciary system are three of the most significant institutional structures that are absent in many developing countries, hampering the emergence of an extended market order and a dynamic enterprise system. Bitcoin’s Smart Contracts can be used to create self-enforcing contracts between strangers, offering citizens of developing countries a framework for transactions independent of the domestic judicial and executive branch.
References


