

Mission Inexecutable

An Analysis of the Advancements & Regressions Made by Facebook's Libra in
the Quest for the Development of a Global Currency

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1 Abstract

This paper discusses the technical contributions of Bitcoin and Libra to the development of a global currency. It describes the Libra Blockchain and Libra Reserve, then analyzes the advances and regressions of Libra in comparison to Bitcoin and traditional international banking methods. Next, it looks at potential benefits the application of Libra could have for the humanitarian space, with a focus on the changing role of intermediaries in banking. It concludes that despite the many innovations of Libra, it is unlikely to be executable due to lack of sufficient security mechanisms to prevent majority control through validation domination or intermediary monopoly.

2 Introduction

While many cryptocurrencies have formed since the original Bitcoin whitepaper in 2008, the 2019 announcement of a company-sponsored cryptocurrency has the potential to be the most high-profile and widely used cryptocurrency thus far – that is, if it is accepted by the reigning governing bodies of the world market. “Libra” was revealed by Facebook in June 2019 with the goal of becoming, according to the Libra Association website, “A simple global currency and financial infrastructure that empowers billions of people” [12]. Facebook now boasts almost 3 billion users which means that if Libra were deployed to Facebook’s users, the company would become one of the largest banking institutions in the world. The Libra Association website states that their goal is to harness the connectivity of Facebook to help connect more people to banks and a secure currency since 31% of the world population (or 1.7 billion people) are unbanked. Thus Facebook’s engineers – allied with humanitarian organizations including Kiva, Mercy Corps, and Women’s World Banking – decided to take on the task of developing a decentralized currency that could exist on a global scale and provide banking services to these under-served areas.

While managed by the Libra Association, an independent not-for-profit, Facebook has positioned itself as the main intermediary of the blockchain. With its new blockchain wallet called “Calibra,” Facebook will allow its users to buy and sell Libra coins using their Facebook accounts

as identity authentication. The Libra Association is also sponsored by other tech companies including Uber, Lyft, eBay, and Spotify as well as several telecommunications, blockchain (such as Coinbase), and venture companies. It also originally partnered with multiple payment companies, including MasterCard, Visa, and Paypal, but these organizations abandoned the project as of October, 2019 [4][19].

Libra coin will exist on a new blockchain with founding nodes located at the headquarters of the partner organizations. It will also have a “Libra Reserve,” or a reserve of tangible assets that back the value of Libra. This reserve is expected to be backed by multiple global currency entities including the Euro and U.S. dollar. Through this reserve, Libra coins will have value on day one that will hopefully alleviate the concerns that proliferate about existing cryptocurrencies – particularly about their precarious stability and inability to provide value preservation. However, little technical analysis has been devoted to analyzing the strengths and weaknesses of Libra’s technical and intermediary model as compared to Bitcoin and how these changes influence its humanitarian mission. This paper intends to contribute to this discussion by merging the technical and ethical discussions about Libra’s feasibility.

3 Libra Blockchain

Since Libra’s stated purpose is to create a global currency that can withstand the changing dynamics of world politics and international relations, the creators argue that “Blockchain technology lends itself well to address these issues because it can be used to ensure that no single entity has control over the ecosystem or can unilaterally shape its evolution to its advantage” [1, p. 2]. Thus by dispersing power over the cryptocurrency among many organizations and across nation states, the cryptocurrency has the potential to be more stable than many national currencies. This section looks at the technical and infrastructural mechanisms through which Libra attempts to become the largest world currency.

3.1 Libra Association

The Libra Association is currently made up of 21 companies that include non-profit, venture capital, payment, telecommunications, blockchain, and marketplace companies. The association will be headquartered in Switzerland in the hopes that it will be able to remain active and impartial during global conflicts due to Switzerland's history of neutrality [13, p. 8]. The Association members will initially be the only ones allowed to have a validator node on the network. However, one of the Association's goals after initial launch will be to gradually transition Libra verification into a permissionless system founded on the principle of "proof-of-stake", a "system where validators are assigned voting rights proportional to the number of Libra coins they hold" [1, p. 24]. At this time, all validators have contributed at least \$10 million to the Libra reserve and have been vetted for commitment to Libra's mission, however the goal would eventually be for any interested party to be able to become a validator, as long as they can contribute appropriate funds, without the need for vetting.

Proof-of-Stake and validator commitment to the success of Libra is incredibly important to Libra's stability. As will be discussed further in Section 3.4, Libra is incredibly susceptible to majority miner attacks and thus relies on the assumption that at least two-thirds of its validators are committed to the continued functioning of Libra.

3.2 Libra Reserve

A key distinguishing feature of the Libra cryptocurrency is the Libra Reserve. Unlike blockchain currencies such as Bitcoin and Ether that have no underlying assets to back the state of the currency, every Libra coin will be fully backed by a set of stable and liquid assets. This way, users can confidently sell any Libra coin through an authorized exchange or liquidity provider knowing that the value will remain relatively stable over time. This will also give the coins "intrinsic value" on day one that will protect against the "speculative swings" of other cryptocurrencies [5, p. 1].

The money in the reserve will come from original investors in the currency contributing tangible fiat assets. These Founding member investors will then receive Libra coin to begin facilitating

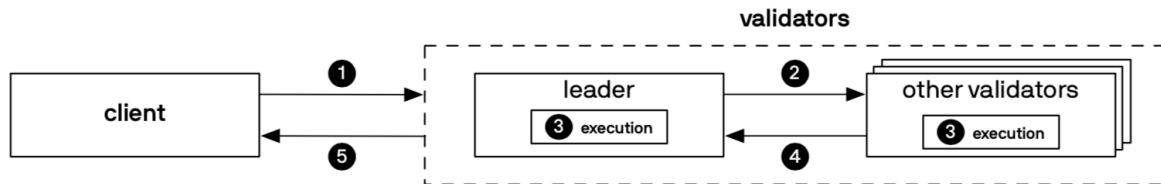


Figure 1: Overview of the Libra Protocol [1, p. 2]

use of the coin. Users can also purchase Libra coin using fiat currency that is then transferred into the reserve. This reserve will be held in a “geographically distributed network of custodians with investment-grade credit rating” and will be invested in low-risk assets. While the plan is for the reserve to contain a variety of currencies across multiple governments, the Libra Association states that with a super-majority vote of Association members it has the ability to stop housing a specific government’s currency should political or monetary instability of the nation-state arise [13, p. 3].

3.3 “Move” Language

As part of the release of Libra, the engineers at Facebook also developed a new programming language called “Move” which will facilitate custom transaction logic on the Libra Blockchain. Move defines a type of constraint called a “resource type” that behaves similarly to a physical asset: “a resource has a single owner, it can only be spent once, and the creation of new resources is restricted” to the original resource type creator [13, p. 5]. On the Libra blockchain, Libra Coin will be one such resource type that can only be created by authorized creators. Other key features of the language are enhanced security protocols and automatic proofs that transactions follow important satisfiability properties. At the time of release, only specific developers associated with the Libra Association will be allowed to create contracts and transactions in Move, however the language is open source and the goal is to eventually open this feature up to all interested developers.

3.4 Consensus Protocol

The Libra Protocol is an implementation of the Hotstuff Byzantine Fault Tolerance Consensus protocol [25]. This consensus mechanism allows for the maintenance of one single, consistent database of executed transactions that have been agreed upon by $\geq 2f + 1$ votes in a set of $3f + 1$ votes distributed among a set of validators. As shown in 1, when a client submits a transaction to the blockchain, a leader is randomly chosen from the $3f + 1$ validators. The leader then poses a set of possible transactions to the other validators. Each validator checks the set of transactions in the block with its own voting rules to decide if it should vote for the block. If at least $2f + 1$ votes are in favor of including the transaction in the chain, a quorum certificate (QC) is created and broadcasted to the other validators. After a block at round k that has a QC is confirmed by two additional blocks with QCs at rounds $k + 1$ and $k + 2$ (led by different leaders), the block is committed to the chain.

Since each validator executes the block's transactions speculatively and without external effect when choosing whether to vote for the block, the validator maintains a computation of the block's effect that can be used to authenticate the result from the database's execution of the block. Additionally, each validator develops its own set of rules for whether or not it will vote for a block. Since these implementations are housed by the validator node and can be audited by external parties as needed, no singular entity controls the universal rules that dictate what types of blocks are valid on the blockchain [1, pp. 17–18].

3.5 Validator & Gas Fees

To encourage participation in the verification voting process and to manage computing capacity demand, the Libra protocol charges transaction fees that follow the Ethereum “gas model” [24]. When a transaction is proposed, one property included in the proposal is the fee that the individual is willing to contribute in order for the transaction to proceed. It is estimated that on average this will be less than a fraction of a penny. Validator leaders can then choose from transactions based on included gas to determine which ones to include in their block of transactions for voting. This

gas fee is later split among validators after processing. Fees are designed to spike during times of high demand in order to decrease excessive usage while simultaneously providing a revenue source for the validators [1, p. 8].

4 Libra versus Bitcoin

The original Bitcoin white paper that introduced the first blockchain-based cryptocurrency described it as “a purely peer-to-peer version of electronic cash [that] would allow online payments to be sent directly from one party to another without going through a financial institution” [18, p. 1]. While many other blockchain-based currencies have been introduced to the cryptocurrency space since 2008 – the most prominent of which are Ether, Ripple, and Litecoin – Bitcoin is still the most widely used coin [14] and thus is a helpful case study to juxtapose against Libra.

4.1 Overview of Bitcoin

In contrast to the voting-based consensus model of Libra, Bitcoin follows a proof-of-work consensus method. Miners all work at the same time to try to solve a puzzle; they must determine a block signature that can be hashed to a given key. This hard to solve but easy to verify problem is generated such that a solution is found on average every ten minutes. Once a solution is found, the other miners are notified so that they can verify the solution, and then they begin working on the solution to the next block. Meanwhile, the transactions included in the original block are uploaded to the blockchain ledger as verified transactions. In the case where two miners find a solution at the same time, the blockchain forks and computing power is split between both chains. Whichever branch finds the next solution in their chain first “wins” and becomes the longest chain, and all miners (if they are operating in their own best interest) switch back to the longest chain – rendering all blocks added to the other branch invalid [18].

While Bitcoin has enjoyed considerable success since its release, there are many issues with its model that make it unsuitable for adoption by the general populace. A major critique is the question

Strengths & Weaknesses of Bitcoin, Libra, and the Traditional Banking System			
	Bitcoin	Libra	Traditional Banking
Deflation Prevention	--	+	+
Value Preservation	--	++	+
Conversion to Monetary Currency	--	++	++
Insurance	--	++	++
Assurance	--	++	-
Environmental Effects of Consensus Protocol	--	++	N/A
Consensus Verification Delay	--	++	+
International Money Transfer	+	++	--
Anonymity & Pseudonymity	+	-	--
Decentralization of Control	++	-	--
Majority Miner Attacks	+	-	N/A
Reliance on Intermediaries	+	-	--

Table 1: Table comparing the strengths and weakness of Bitcoin, Libra, and traditional banking infrastructure to analyze the key areas in which these forms of currency transfer succeed versus fall short of accommodating features considered to be important for a world currency.

of Bitcoin's stability. A malicious miner who attempts to outrace the current chain to produce a different longest chain or a majority miner who holds more than 50% of computing power and thus can control which blocks are added to the chain both have the ability to undermine all transactions on the longest chain. This flaw makes relying on Bitcoin for long term financial storage incredibly risky. Similarly, since there exists a fixed amount of Bitcoin irrespective of usage, the value of Bitcoin fluctuates significantly based on demand rendering it more similar to an investment asset than a currency. Finally, the set-up of a node on the network requires a large amount of technical skill and computing power. Thus, in order for the non-technical average user to participate in the blockchain, the person is required to interact with the currency through an intermediary. This strips away from the average user the primary advantages of using Bitcoin as a currency: anonymity and decentralization of financial control [3].

4.2 Libra's Potential Advancements

Through the fully backed coin, Libra makes a significant contribution to the advancement of stable currencies. Unlike Bitcoin and other cryptocurrencies, the supply of Libra coin is not limited by external factors, so the amount of Libra in circulation is able to grow or shrink depending on demand. It also improves upon existing banking's conception of assured currency. As is written in the Libra Association paper on the reserve, the Libra Reserve "discourages 'runs on the bank' since the typical rationale behind a run is that a coin is only fractionally backed, so users want to get their backing out before others do." However, since Libra is fully backed, "no matter how many coins are in circulation or how many people have already sold their Libra ... the market value of the reserve always supports the value of the fiat currency that users receive if they sell their Libra" [5, p. 3]. Thus, unlike Bitcoin, Libra either matches or surpasses traditional banking methods in important currency features including preventing deflation, value preservation, conversion to monetary currency, insurance, and assurance (the fully-backed coin).

Libra's consensus mechanism (Section 3.4) also takes less energy and thus does less harm to the environment than Bitcoin's proof-of-work protocol. In fact, Libra developers stated in their white paper that they specifically did not consider proof-of-work due to its high energy and environmental costs [1, p. 18]. Proof-of-work for Bitcoin has been found to have a comparable carbon footprint to Denmark, use as much electrical energy as the power consumption of Austria, and produce as much electronic waste as Luxembourg. The carbon footprint of one bitcoin transaction is equivalent to 776,916 VISA transactions or 51,994 hours of watching YouTube. Meanwhile, "the energy consumption of proof-of-stake is negligible compared to proof-of-work" since "proof-of-stake coin owners create blocks rather than miners, thus not requiring power hungry machines that produce as many hashes per second as possible" [2]. Libra's consensus protocol is also considerably faster than Bitcoin's. While a block of transactions in Bitcoin is validated approximately every ten minutes, the likelihood of forking implies that users must be willing to wait multiple hours to be confident that their transaction has been successful, and there is still the possibility that "without unanimity among miners, any change may permanently fork the system" [3, p. 6].

Meanwhile, Libra's developers write that they "anticipate the initial launch of Libra protocol to support 1,000 payment transactions per second with a 10-second finality time between a transaction being submitted and committed" [1, p. 22]. Since transactions do not exist in blocks, conflicts with forking are no longer a concern.

Finally, Libra far exceeds other currency mechanisms in the realm of international money transfer. Traditional banking systems often charge at least \$15 and sometimes upwards of \$50 to transfer money internationally [22]. Meanwhile, Libra, as discussed in Section 3.5, will charge a fraction of a penny for similar transfers. While Bitcoin also allows for international money transfers without fees, it does not provide an easy method for converting the coin into fiat currency or provide a guarantee that the coin after arrival will be worth the same amount as it was when it was requested, thus Libra's additional fiat-backed currency security measures make it far more suited for this task. The lack of fees for money storage and transfer has major humanitarian implications that will be discussed in Section 5.3.

4.3 Libra's Regressions

A major critique of Libra as a cryptocurrency is that while pseudonymous in that it allows users to hold one or more addresses that are not linked to their real-world identity, due to its alliance with nation-state regulatory procedures, Libra will need to include some mechanism for verifying the identity of its users and thus is not entirely anonymous. This critique gets to the heart of the major difference between Libra and Bitcoin. As David Marcus, a co-creator of Libra, posted in a Tweet: "Many want to pit Libra vs. Bitcoin. In my mind these two are not in the same category. BTC is a decorrelated (investment) asset. Libra is designed to be a stable medium-of-exchange" [16]. Most of the features for which Bitcoin excels and Libra falls short are not compliant with national or international currency regulations, hence why they are not included in a "stable medium-of-exchange." At this time, there is no technically feasible ways to satisfy desire for anonymity and pseudonymity with efforts to prevent money laundering or other illegal transfers of resources. Similarly, while Libra does hope to eventually move to a more decentralized system of control,

doing this would require a mechanism for maintaining the Libra Reserve technically rather than through a designated authority – a feature currently limited due to Libra’s stability relying on a store of liquid fiat currency – so it is unlikely the Libra Association will sunset in the near future.

However, there are technical choices that were made by the developers of Libra that could potentially leave the cryptocurrency more susceptible to failure due to the power of majority actors. As was explained in Section 3.4, a transaction requires a super-majority vote in order to be approved and added to the Blockchain. However, this implies that, if there are $3f$ validators, it only takes $f + 1$ validators to have unfettered veto power over transactions [1, p. 17]. Thus, while Bitcoin’s stability is compromised with an actor who has 51% of the computing power [3, p. 7], Libra’s neutrality is compromised with an actor who has 34% of voting power. Considering that Libra’s eventual plan is to convert to a proof-of-stake mechanism for determining how to allocate power, companies or states able to make a large financial investment into Libra could easily gain the 34% of verification power and disrupt the blockchain.

5 Humanitarian Contributions & Ramifications

When Mark Zuckerberg announced Libra, he characterized it as a method for revolutionizing the developing world by providing access to financial services to those for whom traditional banking methods are restricted or limited, either due to cost, reliability, or lack of necessary documentation [13, p. 1]. Unlike other cryptocurrencies, Libra does not try to “disrupt the existing system and bypass regulation” by providing anonymity and decentralization, but instead collaborates and innovates “with the financial sector, including regulators and experts across a variety of industries” in order to ensure that a “sustainable, secure, and trusted framework underpins this new system” [13, p. 2]. Since the stated goal of Libra is not to create a more sustainable version of Bitcoin but instead to develop a functional currency with humanitarian contributions, it is worthwhile to consider what Libra could confer onto this space and potential positive and negative ramifications.

5.1 Access to Banking

The main focus of Libra's humanitarian mission is to provide access to banking for the 1.7 billion adults without a bank account. Facebook users, of which there are now almost 3 billion, could transfer Libra through the Facebook "Calibra" wallet. Libra's vast scale upon release to the Facebook market would lead to Calibra controlling 68% of the market share of world currency – and a monopoly on cryptocurrency – on day one (Bitcoin and Ethereum have less than 50 million combined users) [20, p. 11]. Since these transactions would be occurring on the blockchain, Calibra would be able to handle them much more cheaply than traditional banks [11]. Also, by verifying user identity through Facebook accounts, Calibra would bypass the hurdle of verifying user identity for those who lack physical or state-based identification by relying on digital identity.

Mercy Corps announced that it would become one of the official members of the Libra Association due to the benefits it sees in providing a global currency to developing areas. It believes the currency is a method for providing financial aid to poor folk who do not have identification or a nearby bank; sending money to victims of a natural disaster or emergency situation; or even paying local aid workers in field operations. As micro-financing and cash aid becomes a more common method for providing humanitarian assistance, a streamlined currency and banking mechanism could significantly accelerate the work of these organizations. By having Mercy Corps, Women's World Banking, and Kiva to work with in the development and roll-out of this technology, Libra hopes the right human rights safeguards will be in place prior to release [8].

In the U.S., 52.7% of the unbanked households cite "Do not have enough money to keep in an account" as the reason for not having a bank account. Calibra would eliminate this hurdle. Since in the U.S. in 2017, 18.7% or 24.2 million households, were underbanked – comprising 48.9 million adults and 15.4 million children – lack of access to a bank is a major national issue that Libra could sunset [20, p. 10].

However, there are many who see Libra as a potential threat to developing nations. Michael Kimani, chairman of the Blockchain Association of Kenya and a digital currency analyst based in Nairobi, is especially concerned about the effect Libra could have on the developing economies on

the African continent. He told NPR, “National currencies could be destabilized ... and booming African mobile payment companies like M-PESA and Safaricom could be undercut. Libra could negatively affect the continent’s whole financial sector” [8]. He sees Facebook’s attempt to profit off of developing nations as a “neo-form of colonization” in which “the global rich northern countries and their corporations sit around a table and decide what is good for Africa” [8]. Others are concerned about Facebook’s history of privacy breaches and worry that by introducing a gateway for Facebook to have access to the financial data of its users, there will be even less protections on individual privacy [11][20]. However, the Libra developers claim that there will be no connection between Facebook social media accounts and their Calibra financial accounts [8].

5.2 Currency Stability

Due to the diversified nature of the Libra reserve, it is possible for Libra to become a more stable currency than the currencies of some nations. One example is Venezuela: a country with high inflation, Libra could be a mechanism for people to “safeguard the value of their money” [11]. While Libra’s investments only in low-risk government bonds and central bank reserve assets do not shield Libra from market fluctuations and exchange rate risks – or global financial collapse – they do have the potential to minimize disruptions to the currency following a singular state’s economic crises [20, p. 10].

5.3 International Money Transfers

As discussed in Section 4.2, the cost of international money transfers will be negligible on the Libra blockchain. This has major advantages from the perspective of aid organizations such as Mercy Corps who wish to send money to workers or on-the-ground organizations [8]. An agreed-upon global currency trivializes fears about reliability of exchange rates in international transfers.

A set of organizations specifically interested in Libra for this reason are those in the refugee services sector. One organization that has already pledged to partner with Libra is Valiu: a Colombian-based startup that provides financial services to refugees. The organization has stated that it plans

to use Libra to provide savings accounts to refugees with backing in USD in order to avoid high inflation in their countries of origin such as Bolivia or Venezuela. As Valiu writes on its Refugee Investment Network page, “migrants face a particular disadvantage as many no longer have access to bank accounts, which limits their ability to send money back home. Valiu’s financial services will enable migrants to send funds to their friends and family in their country of origin, which will facilitate an increase in remittances and economic opportunity for those who remain in difficult situations” [23]. Since it has been documented that the majority of immigrants use technologies such as What’s App or Facebook to stay connected with their loved ones [15], extending these already-used services to include financial transfers would be extremely beneficial to immigrants and refugees around the world.

5.4 Democratic Control of World Currency

An argument made by Zuckerberg that has received considerable scrutiny is his insistence that if the democratic nations of the world do not create a digital currency, China will become the primary leader in this space. While critics argue that this is just Zuckerberg appealing to national sentiments as a method of dodging regulation, his argument does have a basis in reality. He told Congress, “As soon as we put forward the white paper around the Libra project, China immediately announced a public private partnership, working with companies . . . to extend the work that they’ve already done with AliPay into a digital Renminbi, . . . and they’re planning on launching that in the next few months” [6]. However, concerns have been raised that Chinese currency could theoretically become part of the Libra Reserve, Chinese companies could join the Libra Association, or Chinese actors could become verifiers. These possibilities beg the question of whether Libra would actually protect the world from authoritarian regimes or just provide a launching pad.

Much of the criticism of Zuckerberg’s argument rests on the idea that the only options are Libra or China since there are plenty of technologists who have called for a national digital currency in the U.S. instead of a company-based currency. Mike Wasyl, managing partner at DeerCreek, a corporate strategy firm that specializes in fintech and works with blockchain companies across

Asia-Pacific and the U.S., told Fortune Magazine, “Libra has made space for a larger conversation in the U.S. about a national digital currency”, which he says he thinks “will be an inevitability.” He said that he believes that China’s digital currency is a “wake up call” for the U.S. and other democratic governments [7]. However, while Facebook’s Libra or a company-developed cryptocurrency might not be the approach that the U.S. government feels most comfortable deploying in its technology battle against China, thus far the state has not been on the forefront of technology development and is currently far less equipped than Facebook and other technology companies to develop an executable and scalable alternative to China’s model.

5.5 Reliance on Intermediaries

Reliance on intermediaries for general access is a primary critique of Bitcoin [10] that is not solved by Libra. As discussed in Section 4.1, due to the high computational costs and technology acumen required to build ones own node on the network, most users end up losing anonymity and decentralization – the perceived benefits of using Bitcoin – because they must rely on centralized and non-anonymous intermediaries to interact on the network on their behalf. However, while Bitcoin has the option to interact on your own server, Libra currently only allows authorized entities to create and deploy transactions thus removing all possibility of decentralization and anonymization. While Section 4.3 explains why the lack of these features is necessary for Libra to exist as a world currency, this reliance creates an existential necessity that the intermediaries through which users interact with the blockchain are regulated and trustworthy.

Unfortunately, at this time the only wallet authorized to handle Libra is Facebook’s Calibra. Due to recent revelations brought about by privacy investigations about Facebook [11], many are concerned that putting all control of Libra into the hands of an untrustworthy company is setting Libra up for failure. Additionally, compared to Facebook’s user base of almost 3 billion, any competitor wallet would face a steep barrier to entry for introducing their software – especially in certain developing countries where Facebook is synonymous with “the internet” [17]. Until a contingent of feasible competitor intermediaries exist, providing Facebook with control over the

world financial market is entirely too risky.

6 Conclusion

In a talk at the Yale Law School, Mike Godwin said: “If Facebook developed a cure for cancer, there would be pundits who would say, ‘Facebook is only curing cancer to get more people to come online. So maybe a cure for cancer isn’t really that great’” [9]. Similarly, Zuckerberg told the House Committee on Financial Services, “I’m sure people wish it was anyone but Facebook putting this idea forward” [21, p. 1]. While he acknowledged that more people spending additional time on the Facebook platform is good for the business, he also insisted that he sees Libra as satisfying an important global need.

Indeed, Libra makes considerable advances to the cryptocurrency space that position it well to become a global currency: fully-backed coin, value preservation, monetary currency conversion, and lack of verification delay. It also has many potentially beneficial humanitarian applications, such as increased access to banking for unbanked individuals, currency stability, ease of international money transfer, and a seat at the table in the fight for democratic control of the future “inevitable” world currency. However, there are several areas in which Libra falls short of meeting security safeguard expectations that one would expect from a global currency. The coin is extremely sensitive to majority miner attacks which is especially concerning considering the plan for the blockchain to transition to a proof-of-stake permissionless system. It also relies entirely on users participating through intermediaries – of which the only company to have an approved wallet is Facebook (which has faced considerable privacy and security concerns in the last year). Thus, while Libra is an excellent contribution to the cryptocurrency and global currency conversation, it lacks the aegis necessary for global adoption and requires further study about the potential harms and their necessary protective measures before release.

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