

Overcoming Economic Stagnation in Low-Income Communities with Programmable Money

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BLOCKCHAINBH

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MOTIVATION

- Blockchain for driving social impact
- *Warm Up!* Campaign
- "Why I registered my vaccines on the blockchain"
- Low effectiveness of aid programmes can be a reflection of the shortcomings of the overarching economic system (Powell, 2002; Majuri, 2019)



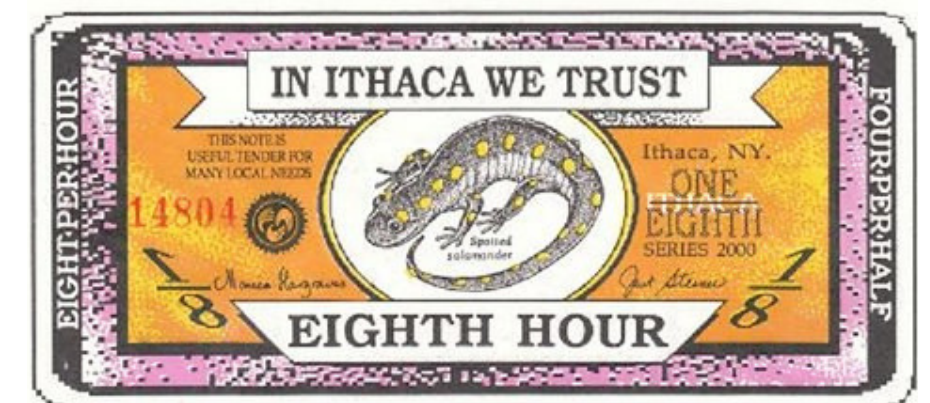
THE MULTIPLIER EFFECT

- The multiplier effect is a concept from Keynesian Economics which states that shocks to an economy will be amplified by a multiplier inversely proportional to the *Marginal Propensity to Consume* (MPC)
- Low-income communities generally have a higher MPC, meaning that they are more likely to spend an additional unit of income
- Thus, these communities are optimal targets for injections, since they can lead to a greater multiplier effect that increases output in the economy
- However, despite being beneficial for the overall economy, injections into low-income communities tend to not benefit the community itself as much
- In order to drive local economic development, it is not enough to think only of the multiplier, but it is essential to consider the "local multiplier"

$$\frac{1}{1 - MPC}$$

USING COMPLEMENTARY CURRENCIES TO STIMULATE A LOCAL MULTIPLIER EFFECT

- Local currencies are monetary systems created to function in only one geographical location
- They serve as an addition, not a substitute, to the sovereign currency
- ~80% of income in surveyed *favelas* was spent outside of the community (UOL Economia, 2018)
- Monetary injections rapidly flow outwards, causing the effects of the multiplier effect to be reaped outside of the neighborhood (For a similar effect, see: France and Germany, 1980s)
- Local currencies ensure the value generated by the multiplier is appropriated by the community, which should have a high MPC



http://farm9.staticflickr.com/8435/7952805368_90d4ef916a.jpg

CASE STUDY - BANCO PALMAS

- Most prominent *Community Development Bank* (CDB) in Brazil and maintainer of the Palmas, a currency used to stimulate local spending and for targeted microcredit
- Operates since 2002 in Fortaleza's *Conjunto Palmares*, a traditionally poor neighborhood with high crime rates (Borges, 2010)
- Paper-based currency pegged 1:1 with the Brazilian Real (Fare et al, 2015)
- Only merchants who fulfil specific criteria can convert their Palmas currency into the sovereign currency (Fare et al, 2015)
- Led to an internalization of spending from a rate of 20% to 93% in 10 years (Fare et al, 2015; Melo, 2011)
- As of 2008, the project managed R\$3,000,000 in assets (Diniz et al, 2008) and over 90% of inhabitants report that the project has had a positive impact in the community (Fare et al, 2015)



http://ec.i.uol.com.br/economia/2012/05/28/palma-moeda-social-usada-pelo-banco-palmas-no-ceara-1338239626994_956x500.jpg

SHORTCOMINGS OF TRADITIONAL LOCAL CURRENCY SYSTEMS

- Only 20.7% of initiated US local currency projects remain active (Collom, 2004)
- Centralization of data and know-how leading to increasing fragmentation rather than convergence and standardization (Longhurst and Seyfang, 2013)
- Paper-based currencies require extensive resources to create and maintain and are difficult to customize after their launch
- Digital currency systems are subject to cyber attacks, abuse of the protocol by its maintainers and lack compatibility with third-party systems
- Issues identified by the author: lack of transparency; reliance on a centralizing agent; difficulty of standardization; resource-intensive nature of maintaining a robust local currency initiative (Majuri, 2019)

BLOCKCHAIN AS A NATURAL ALTERNATIVE

- Bitcoin's launch marked the creation of the first decentralized currency
- After Bitcoin, creating decentralized digital money became an easier task, leading to the boom of *altcoins*
- Creating an *altcoin* still required a good level of technical knowledge, even if the code was simply a fork of Bitcoin's
- The creation of Ethereum and other "world computer" protocols made it easy to launch a cryptocurrency (token) while leveraging the security and robustness of an underlying protocol
- Digital money can now be created with security, transparency and compatibility as an inherent part of the protocol, at no extra effort
- The transparent, decentralized and community-driven aspects of public blockchain protocols are in alignment with the ideals of local currencies (Majuri, 2019)



PROPOSING AN ETHEREUM-BASED LOCAL CURRENCY SYSTEM

- Ethereum allows for tokens to be created with ease which are secure from cyber attacks and offer transparency in the management of the system
- By emitting a token, the managers of the system can save on resources necessary to secure the system and make it compatible with other technologies
- The token can implement special features that make it more suitable to work as a local currency and enforce these by design

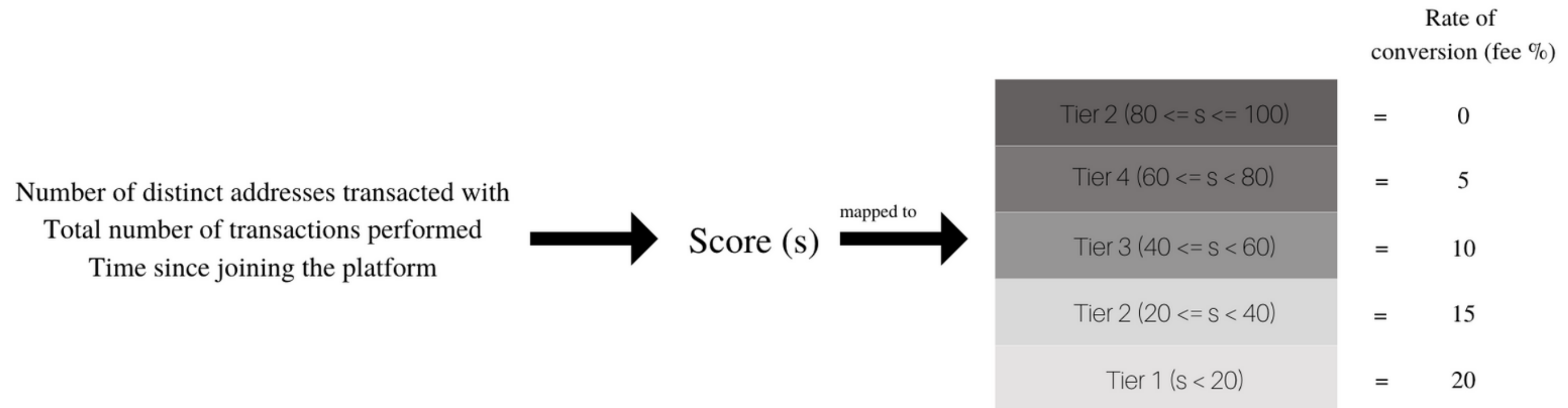


THE FOUNDATION

- Organization responsible for implementing, leading and maintaining the local currency project
- Responsibilities include, but are not limited to: executing changes to the protocol where such are allowed; storage of the collateral which ensures the peg; conversions to and from the currency; onboarding of new users; leading educational projects; seeking investment/donations; establishing partnerships; ensuring the project follows the law (Majuri, 2019)
- The Foundation should include members of the community, not only external participants
- Foundation members have privileges assigned directly in the Ethereum implementation
- Foundation members can act independently on their assigned responsibilities, but the Foundation is in a constant state of election to prevent abuse of power

TIERS OF CONVERSION

- The *Tiers of Conversion* model prevents a "bank run" during the early stages of the project, as well as allows for the "unlocking" of investment as the currency becomes overcollateralized
- A score is assigned to users based on a function which estimates their added value to the network. The greater the score, the lower the fee to convert to the sovereign currency



WALLET

- Since limitations are implemented directly in the protocol, the system proposed here cannot be a hybrid, meaning the currency will only exist in digital form, enhancing the need for an appropriate interface to interact with the network
- An ERC-20 or ERC-20 compliant token can use of third party wallet applications immediately from launch
- A proprietary wallet is nevertheless recommended, for its symbolic value and representation of unity (Fare et al, 2015; Hughes, 2015), as well as for abstracting away complex concepts such as addresses and transaction fees
- A pilot project ran by the author alongside Brazilian organizations BlockchainBH and NAAÇÃO implemented a wallet PoC as a fork of open-source wallet Cashu
 - A Waves token and an Ethereum token were tested

CONSTRAINTS

- Whitelist: A list of addresses allowed to transact with the currency. The whitelist would be maintained by the Foundation, which could choose any method it wishes to onboard new users. The purpose of the whitelist is to prevent the currency from being used outside of the community, limiting speculation and outflows. Arguments can be made for a whitelist not being necessary
- Blacklist: A list of addresses prevented from ever joining the network again. An address can simply be de-listed from the whitelist, in which case it is able to re-join the network and regain its score, or it can be banned completely by being added to the blacklist
- Caps on ownership: Caps on token ownership per user make the local currency a bad store of value, thus ensuring that it circulates. *Marginal Propensity to Save* in the currency lowers as the users approaches the cap, henceforth contributing to a greater multiplier effect

LIMITATIONS

- Transaction fees: As Ethereum currently stands, every transaction incurs a transaction fee in ether, which adds complexity to the user and extra costs to the Foundation
 - An appropriate interface would handle the fee without the knowledge of the user
 - Other platforms could be explored, but Ethereum is currently the most mature
 - Ethereum 2.0 and Layer 2 scalability solutions could solve the problem (e.g. the currency could exist in a state channel)
- Scalability: Will the Ethereum network be able to handle all the necessary transactions in an acceptable time?
 - Could also be solved with Ethereum 2.0 or by switching platforms
- Learning curve: The system must ensure the learning curve is as smooth as possible in order to gather initial traction
 - A design problem: The protocol and tools must be understandable and easy to use

LIMITATIONS

- Legal framework: A blockchain-based local currency is a new concept that may fall in a gray area from a regulatory perspective
 - However, a blockchain-based system adds transparency that facilitates auditing
 - The proposed currency is also pegged and managed by an established Foundation
 - "The regulatory framework is only a problem to the extent that knowledge is deficient, since the transparent properties of the system make it more regulation-friendly than traditional financial software applications." (Majuri, 2019)

SUMMARY

- Complementary currencies tinker with the economic system at the local level to help drive economic development
- The model is based on the concept of stimulating a local multiplier effect, preventing monetary injections from flowing outside of the community and allowing for targeted microcredit
- Despite being a coherent model with a track record of success, local currency protocols often fail to tap into their potential, due to the difficult nature of establishing an entire monetary system
- With the advent of public blockchains such as Ethereum, establishing a robust currency system became a much simpler task, allowing for transparent, secure and customizable currencies to be easily created in digital form
- Thus, an Ethereum-based local currency system is proposed, with features such as Tiers of Conversion, caps on ownership, fluid consensus, whitelist and blacklist, all already implemented in Solidity smart contracts

THANK YOU

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