DAB

Decentralized Autonomous Bank

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***Abstract*—**

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I. INTRODUCTION

A bank is a financial institution that pools social wealth and resources to make events. In a way, the banking system helps promote economic prosperity and assures assets safety: loaning starting capitals for start-ups and entrepreneurs, and at the same time generating interest for depositors. However, traditional structures and modes of economy have been changing with the advent of new technologies, like Blockchain and Smart Contracts. In recent years, people have gradually got accustomed to various types of virtual currencies and applications based on them, which have not got a sound and reliable platform like a bank to invest and earn profits yet. Thus, a call for banking systems of virtual currencies arises. On the hand, traditional banks hold a large share of the profits, which should have belonged to both depositors and loanees. Besides, People are not contented with this hierarchical administration because of its low efficiency and manifold restrictions. The procedures of loaning take numerous risks assessment and audit work. These complicated and repetitive operations increase unnecessary costs both in labor and in material, adding to inconvenience of a loan. Therefore, we propose a self-governed banking system transplanted on Blockchain, naming **Decentralized Autonomous Bank**, **DAB** for short. This will be the first crowdfunded Ethereum banking system on Blockchain in history. The main contributions of this program are as follows:

- The proposed banking system is **crowdfunded** by common users rather than authorities. With Blockchain technology, data of transactions generated by users can be recorded more accurately, and meanwhile these records can neither be modified nor be checked by anyone, assuring its reliability and security.
- The proposed banking system transforms the abstract concept, "credit", into measurable units for new asset class of "**tokens**" that are typically issued in Initial Coin Offerings (ICOs for short) through Smart Contracts to cut out unnecessary procedures for assessment and approval.
- As the first **Ethereum bank** on Blockchain, users of which can enjoy relatively high interest when depositing their Ethereum in the bank and cheaper yet more convenient loaning services than one can do in actual banks.

The rest of this paper is structured as follows. Section 2 gives a detailed instruction of DAB. How the banking system will be crowdfunded, established and finally put into operation is presented in Section 3. Based on the system, section 4 describes DAB's expected outcome in the market of Ethereum. Section 5 refers to recent work and our progress on DAB. Section 6 provides a list of terminologies concerned in the paper.

II. CONCEPTS AND FUNCTIONS

As mentioned above, not only users can deposit, withdraw, lend, loan or repay Ethereum more cost-effective in this crowdfunded DAB, but also procedures on risks assessment and credit approval are simplified. To realize these regular functions, a group of new concepts are needed in this banking system, which contains four types of tokens, two sub-banks and two main contracts.

A. Tokens

Deposit Token (**DPT** for short) is a type of token for depositing function, while **CreditToken** (**CDT** for short) and **Sub-Credit Token** (**SCT** for short) are collectively referred to for loaning function under a joint name, **Generalized Credit Token**. As to **Discredit Token** (**DCT** for short), it is a type of token indicating one's loss of credit.

- **Deposit Token (DPT)**: a type of token for Ethereum deposited into the bank, which represents a share one holds per token in the pool of **Deposit Reserve Funds**. DPT is negotiable in the market and can be either transferred or cashed.
- **Credit Token (CDT)**: a type of token for Ethereum that one user can loan from the bank, which represents a share one holds per token in the pool of **Credit Reserve Funds** and one user's credit ceiling. CDT is negotiable in the market and can be cashed from Credit Bank without any fees.
- **Sub-Credit Token (SCT)**: the secondary form of CDT in the process of a loan, which represents a condition in debt. If the loan is repaid in time, SCT will be elevated back to CDT; if not, the SCT will be converted to DCT, whose value is far less than CDT. SCT is an non-negotiable token in the market, with less value than CDT, and can be neither transferred nor cashed.
- **Discredit Token (DCT)**: a type of token converted from DCT if a user's debt is overdue, which indicates one's loss of credit. It is of less value than SCT. DCT irreversibly decays with **Decaying Factor** of 0.9 as time goes by, but the remnants can be converted back to CDT once the debt is paid off anytime. Although DCT can not be cashed, it can be transferred to another user with a certain number of fees, if the user is willing to repay the loanee's debt.

B. Sub-Banks

DAB is comprised of two independent sub-banks, which are Deposit Bank and Credit Bank. For each bank, there is a pool of reserve funds in it.

- **Deposit Bank**: a sub-bank where users deposit their Ethereum getting DPT as token, and withdraw their Ethereum with their tokens in most cases. The sum of the Ethereum and DPTs deposited are called a pool of Deposit Reserve Funds. Operations on the Deposit Bank are regulated by Deposit Contract.
- **Credit Bank**: a sub-bank where users loan and repay Ethereum, and gain bonus CRT as reward in most cases. The sum of the Ethereum and CRTs in this sub-bank is called a pool of Credit Reserve Funds. Operations on the Credit Bank are regulated by Credit Contract.

C. Contracts

The two main contracts are Deposit Contract and Credit Contract, which are responsible for the bank's depositing and loaning function, respectively.

- **Deposit Contract**: a contract with which deposit-related behaviors are operated and Deposit Bank runs in accordance, such as users depositing their Ethereum into Deposit Bank, withdrawing Ethereum with DPT, transferring DPT to other users, etc. The contract also stipulates that the deposit reserve ratio is automatically adjusted with the variation of negotiable DPTs in the market, thereby calculating the withdrawal price of a DPT at a certain point.
- **Credit Contract**: a contract with which credit-related behaviors are operated and Credit Bank runs in accordance, such as users loaning Ethereum from Credit Bank with CDT, repaying Ethereum, cashing CDT, gaining bonus CRT, CRT degrading, DCT transferring and decaying, etc. The contract also stipulates that the cashing price of a CDT is dependent on the amount of the Credit Reserve Funds, the credit reserve ratio and the number of negotiable CDTs in the market.

D. Behaviors

This sub-section focuses on what users can do in DAB. The main four behaviors that users may carry out are listed below.

- Deposit and withdraw. For one thing, a user can deposit Ethereum into Deposit Bank, get equivalent DPTs as token for a certain share of the Deposit Reserve Funds, and enjoy interest from it. For another, user can withdraw Ethereum and return his/her DPTs back to the bank.
- Loan and repay. A user can loan Ethereum from the Credit Bank according to the number of CDTs he/she owns. Once he/she prepays a certain amount of interest based on the loaning span and get Ethereum, equivalent CDTs are degraded to SCTs immediately. The prepaid interest will be used for issuing new CDTs at four times of the price of its ICO and then the new CDTs will be rewarded to the user as long as he/she repays his/her loan in time. The completion of the loan will trigger a conversion from SCTs to CDTs equivalent in their number. Besides, the user will gain bonus CDTs as mentioned above. But SCTs will be converted to DCTs if the debt is not returned timely. DCT is decayable, which means its number decreases with time. The loss of DCTs indicates permanent loss of level CDTs or SCTs in number.
- Transfer. Most forms of assets can be transferred between users, including Ethereum, DPT, CDT and DCT (not SCT). Especially, the transfer of DCT is another solution for a user repaying his/her debt. Once *Aaron*'s DCTs are transferred to *Bob* and *Bob* repay the debt, those DCTs will be elevated back to CDTs and returned back to Aaron, and meanwhile the corresponding bonus CDTs will be rewarded to Bob.
- Cash CDT. Commonly, CDT serves as a measure of one's credit ceiling, i.e. the maximum Ethereum one can loan from DAB. Despite its cashing price lower than the credit line per CDT, it can still be one-way cashed to Ethereum, if needed.

III. IMPLEMENTATION

DAB is a crowdfunding project, so its final foundation and implementation can not be realized without funds from public. Therefore, this project warmly welcomes those who have belief in DAB or are will to give it a try to provide Ethereum support to the bank. The crowdfunding are divided into two stages: **Activation Stage** and **Expansion Stage**.

Every single person who funds DAB before the activation of both Deposit Contract and Credit Contract is regarded as a founder and a user of it, and will gain a certain number of DPTs and CDTs in return.

A. Activation Stage

In Activation Stage, Ethereum can be deposited into DAB, and users get a certain number of DPTs and CDTs in return. Before the activation of Deposit Contract, users can not withdraw DPT, while CDT can neither cashed nor used for loaning Ethereum before the activation of Credit Contract. The exact allocation of DPTs and CDTs got by a user per Ethereum is indirectly dependent on the number of issued DPTs, which has an influence on a designed parameter **Cash Reserve Ratio**, **CRR** for short, thereby altering the allocation. Each Ethereum funded was split into two parts, *CRR* for DPTs and the rest *(1 - CRR)* for CDTs. Former funders get more DPTs than CRTs. But as the issuance of DPTs proceeds, *CRR* goes down, which makes latter users get more CRTs than DPTs. As regards to the issuance price of the two tokens, they both starts with $\frac{1}{100}$ Ethereum. The issuance price of a DPT functionally increase as the issuance number rises.

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