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Avital, Michel; Hedman, Jonas; Albinsson, Lars

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Michel Avital, Jonas Hedman, and Lars Albinsson

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3 Overview of Talks

3.1 Smart Money: Blockchain-Based Customizable Payments System

Michel Avital (Copenhagen Business School, DK)

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Abstract. Legal tender in the form of coins and banknotes is expected to be replaced at one point in the future by digital legal tender. This transformation is an opportunity for central banks to rethink the idea of money and overhaul the prevailing payment systems. Digital legal tender is expected to reduce transaction costs by providing seamless real-time payments. In addition, digital legal tender that is based on blockchain technology can provide a foundation for customizable "smart money" which can be used to manage the appropriation of money and its use. In essence, the smart money is a customizable value exchange instrument that relies on computer protocols to facilitate, verify, and enforce certain conditions for its appropriation as payment, e.g. who may use the money, where, and for what. If we believe that digital legal tender will become ubiquitous, then the emergence and diffusion of smart money is inevitable and deserves further investigation.

Keywords: money, legal tender, digital money, customizable money, payment system, blockchain, distributed ledger technology.

The infrastructure of payment transactions is interrelated to the nature of money. Not long ago, ships were used to carry coffers of gold and silver coins which had intrinsic value. The growth and dynamics of worldwide commercial markets set the stage for the development of government-issued fiat money in the form of compact paper notes. The digitalization of bank accounts and the establishment of global communication networks, such as SWIFT, was instrumental in the development of today's electronic fund transfer (EFT) system and the virtualization of money. On the horizon, legal tender in the form of coins and banknotes is expected to vanish and be replaced by a digital legal tender that will be exchanged on distributed ledger technology (DTL) based platforms (Avital et al., 2016). Subsequently, the ubiquity of DLT platforms is expected to speed up money transactions as well as to provide the foundation for customizable "smart money" that can be used to manage the appropriation of money and its use as a medium of exchange.

In the last decade, we witness fundamental changes in the inter-bank exchange and payment infrastructure that are designed to tighten control and transparency. Many of these changes are fueled by regulatory pressure to mitigate particular security and compliance issues, such as money laundering, terrorism, corruption, and increase competition. For instance, the European Union (EU) are in the process of creating a single payment market in through the enforcement of the Single Euro Payments Area (SEPA) and the Payment Service Directive 2 (PSD2). The PSD2 forces banks and financial institutions to open up their payment infrastructure to provide third party payment providers with access to bank accounts and initiate payments [4].

Besides the regulatory changes, members in the banking sector experience increasing competition from non-bank players that offer similar and substitute services. Internet giants, such as Facebook, Alibaba, and Google, as well as device manufacturers, such as Apple and Samsung, have entered the financial market, together with at least 12000 Fintech startups [6]. These firms are dependent on the innovative utilization of existing and emerging technologies to challenge the incumbents of the financial sector [2, 7].

The regulatory changes, the technology development, and the competitive challenges are the new normal for any player in the financial sector. Therefore, it is not surprising that legacy organizations and especially banks make massive investments in the current payment infrastructure in an attempt to defend and bolster their respective market position [5]. The new emerging payment infrastructure is designed not only to address the regulatory and competitive issues; it also provides an opportunity to further develop money as a multifaceted medium of exchange that portrays more than merely monetary value. Subsequently, global transaction banking in the future would need to treat payment as a rich construct that goes beyond amount and effective transaction date.

Today, money is a general-purpose medium of exchange with unrestricted usage, i.e. money can be used by anyone to pay for virtually any product or service anywhere. In contrast, besides seamless real-time payments, the future DLT-based infrastructure offers opportunities to customize payments with sophisticated money that portrays a set of customizable conditions in addition to monetary value– i.e. smart money. In essence, the smart money is value exchange instrument that is based on computer protocols which facilitate, verify, or enforce preset conditions for its appropriation as payment, e.g. who may use the money, what products and services can be bought, and where.

Smart money can be used by society, organizations or individuals to manage the appropriation of money and its use as a customizable medium of exchange. Consider the following example:

Gill and Mark, two loving vegetarian parents, have decided to restrict Peter's (their 15-year-old son) use of his weekly allowance. Peter often used his lunch money to buy hamburgers and sodas, so his parents decided to control his use of his lunch money. The transfer of the weekly lunch allowance goes from Gill and Mark's bank account to Peter's mobile wallet, which also entails his identification cards and debit card. On the balance page, he can see how much money he has on his mobile wallet and his bank accounts. The amount of virtual cash is displayed in a pie chart diagram (green, red, and blue) with the amount on. The green pie is money to be used for school lunch. Red money is for clothes. The blue money is to be used for any purpose. The green and red money are the designed money from his parents to buy lunch at school and new pair of jeans and cannot be used for anything else. So, now Peter cannot buy hamburgers for lunch. Instead, he has to buy the regular vegetarian school lunch. Peter is, of course, outrageous and thinks that his freedom and privacy is hampered, but his parents who pay for the lunch are happy campers.

The idea of restricted-use money is not new – it is quite common as a proprietary currency. For instance, governments issue "food stamps" that can be used for food purchase only in designated locations, casinos issue proprietary "chips" that can be used for gambling, and airlines issue "frequent flyer miles" that can be used for flying tickets [3]. In contrast to such proprietary currency, the smart money is a customizable general purpose legal tender that can be restricted or conditioned as desired. Instead of functioning as a designated proprietary fixed-purpose token, smart money (just like a smart contract) affords a customizable multi-purpose digital medium of value exchange in everyday use by anyone.

The transition into smart money-based monetary system requires intermediary platforms that help financial institutors and users alike to experience the new technology and develop it further without abandoning the familiar and trustworthy legacy system. A transition period is necessary not only to allow banks and governments to experiment with different flavors and configurations as well as to develop a support infrastructure but also to allow developing public confidence in the new monetary system. While smart money can provide ample economic incentives to both governments and banks, it is not clear if smart money will

appeal to business organizations let alone the general public. Clearly, one way to develop public interest in adopting smart money would be to develop it as complementary currency [8] that is aligned with the worldview and value systems of intended users. For example, green money that supports or prefers environmentally friendly products and services, healthy money that supports health-oriented products and services, local money that supports local business, and so on.

We envision a multitude of cases where smart money can be of interest. In addition to numerous business opportunities, it will, of course, create a public debate concerning technical and organizational issues as well as social and ethical issues. Different stakeholders, such as banks, merchants, consumer agencies, politicians, health organizations, human rights and refugee organizations among others will take different positions from their respective perspectives. If we believe that digital tender will become ubiquitous in global transactions banking, then the emergence and diffusion of DLT-based smart money is inevitable and deserves further investigation.

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3.2 On Hostile Blockchain Takeovers

Joseph Bonneau (Stanford University, US)

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Abstract. Most research modelling Bitcoin-style distributed consensus protocols (sometimes called "Nakamoto consensus") has focused on attempts to prove incentive compatibility. That is, models attempt to prove that under certain assumptions about attacker motivation a protocol will exhibit desired stability properties such as an exponentially low probability of long chain forks or a distribution of mining rewards that is close the amount of work contributed (called fairness or chain quality). Typically, models assume that the utility