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# WHEN PRIVATE DIGITAL MONEY BECOMES A SIGNIFICANT PART OF THE MONEY SUPPLY

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THE FUTURE OF MONEY

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## INTRODUCTION

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This document is a summary of my studies and assessments on what impact there may be on the global economy if cryptocurrency (what most people call digital money) becomes a significant part of the total money supply. I have been working with Blockchain and DLT (Distributed Ledger Technology) since 2015 and this question has held my focus more and more over the last few years. I have been assisted by competent persons who have made important contributions to this document. As far as I know, few, if any, have conducted a study like this before. CEPR is an organization that has taken part in some research on this topic. Many central banks have conducted studies on the implications of digital money as well; several commercial banks have carried out their own assessments, whilst Fintech has formulated several business plans that focus on the technical aspects. But as far as I am aware, no one has conducted a study that considers the entire situation. I have good insight into the technology, although less so in macroeconomics, which is probably revealed in this document.

I have started several successful Fintech companies that have, one after the other, been sold off to major players. I have worked in banks with Blockchain, such as in Nordea and lately in DNB. I have a bachelor's degree in International Finance from the BI Business School as well as a background as an IT engineer. In addition, I studied a Disruptive Growth course at Oxford University and Internet of Things: Business Implications and Opportunities at MIT SLOAN Executive Degree Programs. I have worked in the stock and foreign exchange market, and as a Independent Financial Advisor.

Throughout this study, I have received comments from people with special competence and important experience. Thank you very much to those of you who have contributed with important information. These contributions have both corrected mistakes made from my lack of specific knowledge, and have made valuable inputs that have improved this document. However, as I alone am responsible for the content, no other names have been mentioned.

There is no section on Blockchain and DLT, as I assume most people who read this paper have sufficient expertise in the technology.

I welcome any comments from you by email to [lasse@finansit.no](mailto:lasse@finansit.no)

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## E-MONEY AND DIGITAL MONEY

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**E-money** is money in the country's currency (for example USD), but in an electronic form. Examples include: money kept in a PayPal account; money stored on an Oyster card in London; or money in the form of an electronic "day pass" with, for example, your local transport provider. The principle is that you fill up the card or account before you can buy anything. E-money is based on the account principle, which means that you have a balance that is deducted each time you pay. In such cases, the customer is dependent on trust and credit risk with a central provider (PayPal, Oyster). Most often, e-money moves within a closed network such as PayPal, where a person with a PayPal account pays to another person with a PayPal account. Money kept in a bank-account, in a bank, is not considered to be e-money in a legal sense.

**Digital money** is more like cash in digital form. Each coin often has a number; so, when you pay with the digital coin, it is that one coin that moves from the sender to the receiver. There is no "balance" with digital money, other than being able to sum up all the digital coins you have in your e-wallet. This also means that Blockchain and DLT technology can easily solve the "double spending" problem, without being dependent on a central counterparty, such as a bank.

Most people have an understanding of what money is and what it can be used for. But, with globalization and the flow of information from all parts of the world, it is about time we ask questions about **what money really is**. When residents of Venezuela experienced a 2,616% inflation in 2017, money became neither an effective means of payment nor a way of storing value, and by definition, became no money, even if it is still issued by a central bank.

In addition, new technology, and especially the technology behind Bitcoin (Blockchain), has created numerous new ways of transferring value from one person to another; digital money therefore becomes both an effective means of payment and, in part, a way of storing value, as well as becoming a new unit of measurement.

The classic definition of money is:

1. A means of payment
2. A way to store value
3. An accounting unit

It may be about time to analyse and assess the possible consequences of non-central banks and commercial banks issuing means of payment that function as both a store of value and as a unit of measurement. The challenge here is that this new money, and thus new money supply, would potentially be outside of the influence of the Ministry of Finance, the central bank and the commercial banks. What impact does this have on setting the interest rate in a country, or on loan/credit volume, gross national product, purchasing power in relation to other countries, savings and consumption? This report intends to dive into these issues and try to analyse some of the consequences.

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## HYPERINFLATION DESTROY MONEY & TRUST

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As mentioned throughout this document, **trust** is fundamental in dealing with money. Trust is what makes us confident to use the money we get from our employer to buy something in the store. Confidence is what makes us dare to put money aside in case we need it sometime in the future. Trust is the foundation of our entire economy.

Venezuela had a 2,616% inflation in 2017, according to an article on Thomson Reuters from January 8, 2018 and even more in 2019. The exchange rate of the country's currency, Bolivar, decreased by 35% compared to the US dollar, in December 2017 alone. At the same time, the central bank was issuing new money into the economy and increased the money supply in 2017 by more than 1,000%. In a country with the world's largest proven oil reserves, people and shops were desperate for food, hospitals lacked medication and the population was suffering. No one wanted to use the central bank's money and eggs became one of the most used means of payment. Those who managed to obtain US dollars used it both as a means of payment and a way of storing value. On the black market, the local Bolivar has become almost non-existent as a means of payment. Those who have technical expertise use cryptocurrency for the same as dollars. Trust in the central bank is totally absent.

But it's not just Venezuela. Zimbabwe has an interesting story. The Republic of Zimbabwe introduced the Zimbabwe dollar (ZWD) in 1980, which at that time was worth more than the US dollar. Zimbabwe had a rich farming industry and provided many neighbouring countries with agricultural products. But when the drought set in, the country was hit by hunger, refugees and hyperinflation. The ZWD was discontinued in 2015 and the government gave an official rate of 1 USD as equal worth to 35,000,000,000,000 ZWD. After that, a group of foreign currencies became legal tender, such as the Euro, US dollar, Botswana Pula (BWP), Indian rupee (INR), and South African Rand (ZAR), in which the US dollar became most widely used. Zimbabwe has reduced inflation in recent years and it appears to be stabilizing with an inflation rate of around 4%. Early 2019 they reintroduced the ZWD and the hyperinflation returned with a inflation of 175 % on annual basis June 2019.

In countries where the dominant currency for both payment and storage of value is not the country's own currency, an interesting observation to note is that the country's authorities and central bank no longer have the ability to control either money supply or interest. The ability to influence financial stability is therefore significantly reduced, which is possibly a good thing for many of the countries in question.

There are a number of other examples of hyperinflation throughout history, both from Germany around 1920 and Hungary just after World War II, as well as several of the former Eastern Europe countries after the fall of the Berlin Wall. An important point to consider in countries with hyperinflation is that it is not necessarily the monetary policy regime that is wrong, but how it is managed, both in isolation and in combination with other economic decisions. Often, the central banks of these countries are also governed directly by politicians and dictators.

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## WHAT MONEY DO WE USE TODAY?

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Today we have up to now two types of money for the public (often called retail money). In addition to retail money, banks have wholesale money between them; the central bank has 'reserves', which is what the commercial banks deposit into the central bank in order to make the payment infrastructure work. Deposits in the central bank (the reserves) are considered risk-free. This is, as with cash, claim on the central bank (the central bank owes you), which is interest-bearing, with either positive or negative interest rates.

**The first type of retail money is cash**, which is received from the central bank. Cash is becoming irrelevant as a means of payment in Norway, Sweden and other countries. Only 2.5% of the M1 money supply in Norway in 2018 was from cash. In Sweden, it is increasingly apparent that cash is not accepted at the till; stores can now choose not to accept cash. In Norway, too, the shops are testing this option; for example, Elkjop Phonehouse (a mobile phone chain) stated that from January 2019 they would not accept cash. Stena's ships from Norway are also cashless. The issue in Norway is that the Central Bank Act requires stores to accept cash. By law, cash is a compulsory means of payment, so that the person in ownership of cash can use it to make themselves debt free when buying in physical stores. The store can also accept other means of payment, such as Euro or US dollars, or even Bitcoin. There is no gold or silver to exchange for cash at the central bank.



**The other type of money is commercial bank money**, also called book money, which is claim on the commercial bank (the bank owes you). This money is created by the banks when they give loans and credit to their customers. In practice, they "print" money out of thin air. On the bank's balance sheet, securities/collateral are listed on the liability side whilst the loan amount is listed on the asset side, in equal amounts. This means that customers owe the bank the loan/credit amount, while in principle the bank owes the customer the house, inventory or whatever is listed as collateral to receive the loan. The central bank doesn't play a part in this money. The result is that there are loans that create new money, and money is an interest cost to the society. It is worth noting that the central bank today, too, cannot control the money supply of commercial bank money to any great extent. Their most important "tool" is the interest rate and liquidity, while politicians can use taxes and regulations. Banks need liquidity when a customer withdraw money from the bank account, for example when buying a car, that is another story.

The capital adequacy regulations (Basel) impose requirements on banks to store some money in the case of a financial crisis. This means that banks must have some capital "available" in case of new crises.

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## WHAT IS PRIVATE DIGITAL MONEY?

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Private Digital Money (PDM) is a new term, used more and more often last few years. Private Digital Money refers to money that is not issued by either a central bank or a commercial bank. Most often, it is a technology company that has created this new money. Other terms for this kind of money are cryptoasset, token or cryptocurrency.

Bitcoin was the first of a large number of PDMs introduced in 2008. Many will, and rightly so, state that Bitcoin is not money. However, throughout this document, Bitcoin is referred to as money, because it: 1) can be used to pay with, 2) is a unit of accounting and 3) can be used to store value. Although points 1 and 3 can, of course, be a topic for discussion, this study will continue to use the term cryptoasset for bitcoin and similar PDMs.

In any payment transaction, there are between 2 to 3 different banks involved, including their many old IT systems, plus net settlements in the central bank or clearing house. Whereas in a decentralized architecture such as Bitcoin, only one verifier (mine) is involved to ensure that the same coin is not used twice. The popularity of Bitcoin has led to many miners competing to mine Bitcoin's next block, which in turn has resulted in enormous electricity consumption. However, it is "unfortunately" this consumption of energy that makes the whole network safe and trusted. Hopefully, in the future, the cost of mining will be brought down to the level it was when Satoshi launched Bitcoin in 2008, something the DLT network, such as Stellar, is working on now.

After Bitcoin, thousands of new cryptoassets have emerged, such as Ether, Bitcoin Cash, Bitcoin Gold, XRP, Stellar, EOS, Litecoin, Tron, Cardano, and IOTA. A common link in all of these is that there is no responsible organization that has created them and there is therefore no one to complain to when something goes wrong. The values are more or less created out of thin air and there is neither real estate nor other assets that support the value of the money. But these PDMs can be used both to pay with and as a unit of measurement, and to some extent as a store of value, so, in this sense can be called money. The biggest drawback is the huge volatility in value, fluctuating at a rate of up to 10% in a day. In an analysis, Linda Schilling and Harald Uhling have found that the volatility of Bitcoin in recent years is 4% daily, based on 90 days of standard deviation. But compared to Zimbabwe's dollar, the value is quite stable.

Something that received a lot of attention in 2018 was Stable Coin, a private monetary unit with a fixed rate against USD, the Euro or other currencies. This makes it more suitable as a means

of payment, but not for speculation. One example of a stable coin that is expected to be launched in late 2021 is USC (Utility Settlement Coin), changed name in 2019 to Finality. The project started with Swiss bank UBS and a small group of other banks, but has since expanded month after month. The technology is a type of Blockchain/DLT. The purpose is to launch a digital monetary unit that can replace or in addition to the USD as a settlement currency in international trade. The architecture also covers cross-border payments and may possibly replace SWIFT and traditional infrastructure with correspondent bank and a nostro/vostro bank

account. In the books of the bank it seems to use nostro/vostro accounts as settlement, but settlement is on-chain. Also, other forms of security might be allowed, such as, for example, listed shares on the stock exchange. Finality covers PvD (Payment versus Delivery) and PvP (Payment versus Payment). The value of the USC is always 1:1 to fiat currency's for example USD, EURO, GBP, JPY or others and is backed by deposit in Central Bank, risk free.

However, there are a dozen other stable coins that were launched before December 2018, such as Tether (USDt), BitShare and NuBits, with a daily payment volume of USD 2 billion. The first stable coin was launched in 2014.

Another large bank, JP Morgan launched its own Private Digital Money (PDM) on February 14th 2019. This is a monetary unit only for JP Morgan corporate customers for faster and cheaper payments between JP Morgan's major customers and cooperating banks. JP Morgan is one of the largest banks in the world with 256,000 employees and offices in most countries. It is easier to create a monetary unit within the same bank account system as JP Morgan does, than it is when more banks are involved and liquidity needs to be moved between banks. Yet this news from February 14th 2019 tells us a bit about what we can expect from the next 2 to 3 years. Later in 2019 Deutsche Bank AG was allowed to test the JPM Coin.

Another major player, Facebook, launched the idea of Libra, a stable coin linked to a basket of large currencies. Mastercard, Visa, PayPal, Coinbase and 28 other large companies were all involved in the Libra project from the start. Facebook expects more than 100 partners/members by its launch before summer 2020, including more banks and regulators. Libra is the name of the currency/coin. Libra Foundation in Geneva Switzerland governs the Libra money, and each member has an equal right to vote on decisions regarding the money, meaning that Facebook has no more of a say than any of the other companies involved.



Libra run into trouble later in 2019 when Visa, Mastercard and another 6 announced they pull out of the projects, but by March 2020 Libra Foundation inform there are more than 1 600 others to replace them. Another issue is that a number of regulators and government have said they will ban it when launched, but Libra again say they will be compliant to any regulatory demand. Time will tell, and the plan is to launch late 2020.

Private Digital Money is, in principle, not a new phenomenon. For example, China has had QQ for over ten years, a virtual currency that some companies use to pay out salaries to their employees with, as one can shop with the currency in many places. In the Nordic region, we have had SAS Eurobonus (flight mileage) for a number of years. EuroBonus can be used as a means of payment, a way of storing value and a unit of measurement, thus filling all 3 of the criteria required to be called money.

Macro-economists claim that PDM has no intrinsic value depending on what covers the value, such as oil or gold. Commercial bank money has some form of intrinsic value as it is a mandatory means of payment, based on the Central Bank Act. Thus, we have the confidence to use that money to pay with, whereas PDM is "just" a computer program. If these PDMs can also be used for both in store shopping and online shopping, and are accepted by all as a means of payment, Private Digital Money will then also be given an intrinsic value. If public services accept, for example, tax payments in PDMs, as some states in the United States (Ohio, Arizona, Georgia and Illinois) do with Bitcoin, the intrinsic value of PDM will gain even greater acceptance.

**Why might we get more Private Digital Money?** 1) Digital money payment travels much faster from sender to receiver, and especially cross country. 2) The infrastructure becomes simpler and cheaper, in contrast to the current infrastructure where there are usually 3 banks plus a central third party (central bank or clearing house) involved. 3) There is a growing need for micro-payments, as we each contribute to hundreds of payments every day, a small amount of money each time. IoT and the new mobile network 5G will contribute to this. Today's infrastructure is too expensive and slow when dealing with micro-payments. 4) Blockchain technology has the ability to remove counterparty risk and also create smart contracts. If one uses smart contracts to robotise process flows, one must necessarily then use a PDM for settlement. 5) The shop and/or customer today pays between 1.5% and 2.5% of the payment amount to Visa, Mastercard and other card companies. In Norway alone, this amounted to NOK 10 billion in 2017. The future will not accept this level of cost for payments.

The Centre for Economic Policy Research (CEPR) is an international organization that in recent years has conducted a number of studies based on the consequences of Private Digital Money. Professor Sayuri Shirai has written several articles on the topic, and in an article from March 6<sup>th</sup> 2019, released the following graphic:

From professor Sayuri Shirai (<https://voxeu.org/article/central-bank-digital-currency-concepts-and-trends>).

	Retail	Anonymous	Traceable	Person to person	24 /365	Interest
Cash	Yes	Yes	No	Yes	Yes	No
Central bank reserve	No	No	Yes	No	Office hour	Yes
Commercial bank money	Yes	No	Yes	No	Office hour	Yes
Private Digital Money	Yes	Yes	Yes	Yes	Yes	Yes
Account model not DLT	Yes	No	Yes	No	Yes	Yes
Value model not DLT	Yes	Under 250€	Yes	Partly	Yes	Partly
CBDC, DLT, Retail	Yes	Yes	Yes	Partly	Yes	Yes
CBDC, DLT, Wholesale	No	Yes	Yes	Between banks	Yes	Yes

Private money sourced from somewhere other than a bank is what I call PDM here. Both the Swedish and Norwegian central banks envisage two different models for digital central bank money (CBDC). **The account model** means that individuals and businesses can have a deposit account in the central bank and use it to swap to digital central bank money. **The value model** means that the public buys digital central bank money and fills up a payment card or mobile app for payment, a bit like e-money. More about the account model and the value model later. These two lines in the figure assume that the central bank does NOT use DLT or Blockchain technology. CBDC retail means that the central bank issues money based on DLT or Blockchain, a cryptoasset. This is something Lithuania, Israel, Uruguay, Senegal, China, Tunisia, Venezuela and other countries that can be considered as having an economy that is "not mature" are exploring. CBDC wholesale is central bank money based on DLT or Blockchain that only banks can access through a collective settlement. Typically, mature economies like the EU, USA, Canada, Japan, Singapore, Thailand and South Africa are exploring this. Mature economies have more to lose on instability and loss of confidence than emerging economies.

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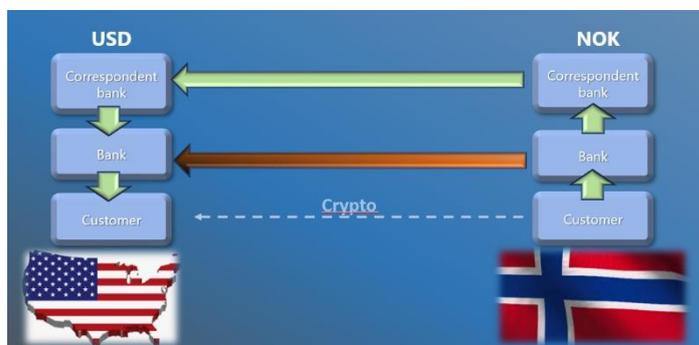
### THE WAR ON THE GLOBAL TRADE CURRENCY

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After the last world war ending in 1945, USD has been the most widely used settlement currency in global trade. This was the result of the Bretton Woods conference in 1944, as the United States was the only country still to support USD value by gold. As a result, USD accounted for 61.5% of all global foreign exchange reserves in 2019, down from 66 % in 2014. This is followed by the Euro at 20.4% and then the British Pound. Russia has long expressed a desire to replace USD as settlement for oil and gas, to get rid of US dependency. China has taken the floor in recent years for Chinese Yuan to be used in trade where Chinese companies are involved, which is a relatively large part of international trade. And over the last year, the EU has started a project to use the Euro more actively in global trade. There is therefore a fairly clear consensus on collectively pursuing a global settlement currency other than USD. Both China and Russia have dramatically reduced their reserve in USD last 10 years, although China is still the largest creditor.

This is particularly interesting in this context as Private Digital Money is likely to play a crucial role in the future of currency reserve.

Ripple xRapid is an example of Private Digital Money potentially playing a role in cross-border payments within a few years. Today, this is done with a bank to bank infrastructure where each sender bank has a correspondent recipient bank in most other countries. In this correspondent bank, the sending bank has a deposit account, so-called nostro or vostro account, which is used to pay out in the receiver country. In this way, liquidity between banks is moved internationally with



messaging services from SWIFT. The time it takes to travel from sender to receiver, end to end, is often several days, and includes around 3 to 4 banks. Ripple xRapid "shortcuts" this whole process. A company in Norway wants to pay to a company in the US. The payer does so in Norwegian kroner at the Norwegian bank. The bank uses a

crypto exchange to switch from kroner to the cryptoasset XRP. The bank sends XRP to the bank in the United States, which does not have to be a correspondent bank, but rather the bank that the receiver uses. The US bank uses a crypto exchange to sell XRP and buy USD, which is then delivered to the receiver. In this way, neither the correspondent bank nor the nostro account is involved. The time it takes from sender to receiver, end to end, may only take a few minutes. However, it requires liquidity on both sides of the crypto exchange. xRapid is not alone in doing so. IBM has a comprehensive project called Blockchain World Wire that works more or less in exactly the same way, other than the fact that IBM uses a cryptoasset called Stellar. With such a mechanism, the war on the global trading currency is moving to a new level.

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## MONEY IN THE NEW ECONOMY

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Based on the aforementioned information in this document, I will look into a possible future here.

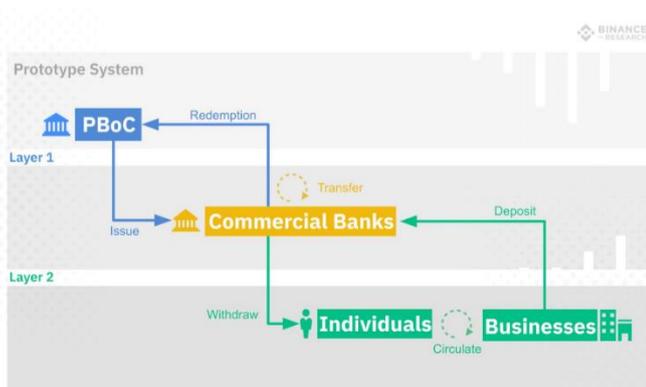
### DIGITAL CENTRAL BANK MONEY

The English term is CBDC or CBCC (Central Bank Digital Currency, Central Bank Crypto Currency).

Here is my bullet short summary after reading a number of central bank reports last 12 months:

- The Central Bank need full control. This means issue of new CBDC and redemption of CBDC. This also means that the central bank grant right to a few been able to verify transaction (nodes in a DLT) and some central banks also expect verifiers/nodes to be within the country physical border. This means they have to be regulated.
- The technology might be Blockchain/DLT or any other technology.
- IF Blockchain/DLT it has to be private chain (permissioned). There has to be a governance structure on development, someone need to be in accountable and responsible so that fully "open source" will not work. (the Swedish Central Bank is in pilot on Corda, Cambodia pilot with Hyperledger Irhoa, Marshall Island have introduced CBDC on Algorand – all of them private chain with governance structure)
- KYC/AML/CTF will be with other than the central bank. Most likely this will be private banks and regulated Fintech companies. They will also be responsible for custody and by that cyber security, anti-thefts, and make sure people do not lose their new money.

The central bank of Norway has outlined two different principles for CBDC in their 2018 report: 1) The account principle means that people and businesses get a bank account with the central bank, risk-free and possibly with interest. The deposit in the central bank is converted into a digital monetary unit for payments (CBDC). The second principle 2) is called the value principle and in many ways works the same as e-money, a payment card or a mobile app, in which you fill up with CBDC from the commercial bank money (or possibly with cash?). The Norwegian Central bank issued a new report June 2019 with the conclusion that may be a “token model” is better. The token model is close to the account model, but take into account that the central bank issue CBDC and commercial banks distribute it like cash today and do the KYC/AML screening. Regardless of the principle, the central bank can obtain important information about transaction history when introducing the CBDC, which they cannot currently do with cash.



Sources: Digital Currency Research Institute of PBoC, Binance Research

This figure is taken from a Binance report of the China CBDC. A private bank request CBDC from the central bank, and receive CBDC reducing their balance on central bank reserve. Then the private bank (+ AliPay and WeChatPay) can supply private and companies with CBDC. This is close to the process they use today when issuing cash.

A few countries have already launched digital central bank currency, such as Venezuela (Petro) which was launched in February 2018, and Iran in August 2018. Both countries are experiencing US sanctions and both have huge oil and gas resources that they struggle to sell and get paid for. A digital currency could possibly have bypassed the sanctions, had Trump's administration not banned anyone from touching these digital monies. While Venezuela is using the Ethereum Blockchain technology (ERC20), Iran has its currency on Hyperledger Fabric. Although neither of these two CBDCs will most likely succeed in particular, they are interesting case studies for the future consideration of

The Canadian central bank said in June 2018 at Money2020 in Amsterdam that they will launch CBDC within 3 years. Most central banks in major western countries have projects for CDBC, and there are an increasing number of reports and analyses from various central banks. You can find more information via links to relevant websites at the end of this document.

Another interesting piece of information in this process is the emergence of digital money from local authorities.

### Canadian City Calgary Launches a Digital Currency to Boost Local Economic Activity



One example is the city of Calgary, Canada, which in December 2018 launched the Calgary Digital Dollar. Calgary has a notable history to consider, as the city introduced the Calgary Dollar in 1996. Stores are obliged to accept at least 10% of the payment on trade in Calgary dollars. The purpose of this was to contribute more trade taking place locally.

You cannot exchange Calgary Digital Dollars for Canadian dollars at a currency exchange. You can only get the new money by contributing to the local community or by promoting local goods. The digital money can then be used to pay with. Considering how money is "printed" today, this is a thought-provoking way to create new money. Not based on existing fiat money.

Calgary has copied this idea from the E-Ora project in the Orania district of South Africa. There are a handful of examples of local digital money around the world. In a future digital economy, where countries also have digital central bank money, such local variants are likely to be more readily available and used even more.

Most central banks in the world have seigniorage as a significant source of income. This has meant that central banks can be independent from political pressure in many countries. For example, President Trump has criticized the central bank (FED) for setting interest rates too high. Using PDM alongside a cash-free society could reduce much of these seigniorage revenues.

Another point to consider is whether the central banks and/or the authorities want to introduce something similar to a capital adequacy regulation (Basel) for PDM, if the CBDC becomes a significant part of the money supply.

### **Some more benefits**

The fact that payments can be made faster and cheaper is an advantage and can lead to heightened stability and increased economic activity in the economy. In addition, the decentralized architecture means that it is more difficult to break down or hack the payment infrastructure in relation to today's technology. This may mean that confidence in the financial infrastructure increases, especially in parts of the world where confidence in the banks is low, which applies to something like 80% of the world's population.

In countries where groups of people do not have a bank account, the so-called "unbanked", a digital monetary unit could help millions of people to escape poverty. This happened, for example, in Kenya, where M-PESA has led thousands of new small businesses and millions of people out of poverty. M-PESA uses "airtime" as a means of payment and value storage through mobile phone "accounts". M-PESA accounted for 60% of GDP in Kenya in 2015. Mobile phones are used by around 80% of the population.

### **Some risks.**

If people deposit money in the central bank in order to have access to CBDC in their wallet, private banks lose deposit. Most people and companies would prefer to deposit risk free in the central bank, rather than at risk in a private bank. Private banks use the liquidity from customer deposit to fund loans and mortgage to customer. In Europe 44 % of loans and mortgage is funded by customer deposit on average. This means banks have two choices, either reduce credit given or fund more expensive by issuance of bonds or other, giving higher interest rate for loan customer.

The technology has to be extremely stable, 24/7 and no planned downtime. Technical problems will cause loss of trust and financial instability.

Secure custody and resistant to theft are important.

There is a balance between privacy and fighting corruption and terror financing. Digital money is traceable, cash is not. Finding the correct balance is difficult.

## Lower interest rate level.

Cash can have neither a positive nor a negative interest rate. There is, theoretically, a lower limit for the central bank's interest rate, which is just below zero (a negative interest rate), known as The Zero Lower Bound (ZLB) or Zero Nominal Lower Bound (ZNLB). However, the central bank does not have any problems with negative interest rates on deposits from the banks. This means that the banks may want to have central bank reserves kept in cash if the negative interest rate on deposits into the central bank becomes



too large. (Although this may not be practically feasible). This is called "zero lower bound problem" (Ball, 2014). After the recent financial crisis, we have had very low interest rates to accelerate the economy and, in many countries, negative interest rates. Low and even negative interest rates at the central bank appear to be becoming the rule and not the exception in the future, since the 1970s and 1980s when central banks succeeded in getting inflation under control. The challenge with a constant low interest rate is that central banks lack the tools needed for when a new crisis arises, meaning that there is a risk of recession and a steady test of the theoretical lower limit for the interest rate. When the ECB lowered its interest rate to minus 0.4% in 2016, the German Savings Bank Association of Bavaria recommended having cash reserves that were interest-free. The challenge for the German banks was, of course, that the reserves used in connection with payment transactions had to be in electronic form.

Various approaches have been proposed to address these challenges, such as raising the inflation target, introducing fee or tax on cash holdings, or having exchange rates between commercial bank money and cash (central bank money). At this point in time, no such thing has been done. DLT enables both negative and positive interest rates. It is conceivable that frequent tests of the negative deposit rate limit could undermine confidence in the central banks.

## CAN PDM CHANGE THE BANK STRUCTURE?

Most central banks in the West seem to prefer the account model as a possible future form of CBDC, which means that private individuals and companies can open a deposit account with the central bank, which is something that only banks can do today. The Norwegian central bank issued a new report in June 2019, in which, contrary to their report of 2018, they have switched and have now opted for the token model rather than the account principle. For the account principle, it will probably mean that, if central bank deposits also yield interest, deposits will be moved from the commercial banks to central banks, as the credit risk is lower, with some even believing that there will be a zero-credit risk.

Large parts of the liquidity of banks' loans to customers are deposits from other customers, which would thus be reduced.

A significant systemic risk in today's financial ecosystem is the banks' imbalance in terms of duration of liquidity. About half of the liquidity of the loans most banks make is financed by deposits from customers. Deposits can be withdrawn within minutes. This means that the liability side in the banks' balance sheet has a very short duration. The asset side, i.e. loans to customers, has a long maturity, often lasting several decades. This imbalance can lead to banks suffering from a liquidity shortage, followed by technical bankruptcy, if a so-called "bank run" occurs. In such situations, the central bank can contribute with liquidity in cooperation with the government to

save the banks. This happened during the last financial crisis. The EU have stated that this will not happen again. The introduction of CBDC may possibly reduce the effect of commercial banks' money printing and therefore reduce the central bank's need to be the "last resort", which would in turn create a new system with more stability than today. Belgium's central bank (link at the end of this document) has discussed such an opportunity in its excellent report.

The obvious change in the CBDC being based on the account principle is that the commercial banks' debt/balance sheet will be reduced, while the central bank's debt will increase. The disadvantage of this is that banks must obtain liquidity for their loans to a greater extent through other channels such as share capital, bonds or other forms. This can lead to more expensive loans for the public, which in turn affects economic activity and inflation, and would thus provoke a reciprocation from fiscal policy and the central bank. On the other hand, the effect of the banks using the bond market with longer maturities will counteract the effect of the imbalance in maturity mentioned earlier.

There is a discussion taking place in most countries about the effects of CBDC. Some believe that the fact that the central bank issues more money than today results in a considerably larger seigniorage income into the central bank, which is good. While others believe that confidence in central banks can be reduced as the central bank becomes a more active participant in the economy and the "printing" of money.

#### **SHADOW BANKS**

There is a risk that "shadow banks" may emerge when radical changes in the financial system are made, for example, as in China over the past 10 years, where new organizations, that are not traditional banks, offer loans based on equity or other sources of funding. In the UK, P2P lenders have had an almost exponential development over the past 5 years and now account for almost 20% of the lending volume, and even more in the US, both for private and corporate customers. So far, the volume in Norway is negligible, but it is expected to increase as it has in most Western countries.

#### **COMMERCIAL BANK MONEY**

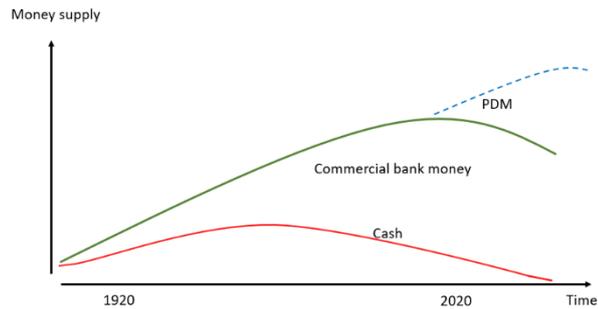
It is credit, or the demand for loans, and the banks' ability to provide those loans, that controls money supply. Loans represent the largest source of income for most banks. 69% of DNB's bank (the largest bank in Norway) income in 2017 was a result of profit from lending, called "net interest". For the consumer loan/payday loan banks, the percentage is close to 100%. If the money supply was turned over to a PDM without interest rates, it could have dramatic consequences for the entire banking industry. It will therefore be absolutely essential that the commercial banks follow the development of cryptoassets and Stable coins in the future. One of the most negative developments for banks could be in the emergence of platform companies like Google, Facebook, Amazon or Alibaba, if they were to become dominant players in the banking industry. These already have most people and businesses in the Western world on their customer list with a profile.

Facebook's Libra project, as aforementioned, is an example of such money, but there will most likely be even more similar projects emerging over the next few years, and probably from the largest banks in the world. Each bank's cryptoasset, such as JP Morgan's, will hardly work in the long run though.

BIS (The Bank for International Settlements) launched a report in June 2019 that came to the same conclusion: if, what they call, Big Tech becomes dominant in the payment industry, this would be bad news for the banks. Big Tech companies have billions of customers and can use their platforms as a strategy to gain market shares quickly.

## PRIVATE DIGITAL MONEY

The volatility of Bitcoin and other cryptoassets makes it unfavourable as a means of payment and store of value. Therefore, Stable coin is probably a better digital monetary unit for the future. However, Stable coin also has its disadvantages. Firstly, a "single point of failure" is introduced by the bank in which fiat money is deposited as issuance to cover/provide collateral, or if the central bank or a regulator freezes the funds. Secondly, some of the new stable coins use an 'algorithm central bank'. An "algorithm central bank" means that there may be no deposit of fiat money, but the price would instead be linked to a currency, such as USD, so the "central bank" issues more money when there are too many buyers and buys back when there are too many sellers, to keep the price fixed. After several attempts, such as Basis, no one has completely succeeded in this strategy yet.



The Chinese technology companies that have been granted bank licenses in several countries with Ant Financial (AliPay) and Tencent (WeChatPay) at the forefront also work with international payments using cryptographic assets. AliPayHK (Hong Kong) launched GCash together with a telecom company (Globe Telecom) in the Philippines in the summer of 2018, a cryptoasset for people working abroad to use to pay home to their families, initially from Hong Kong to the Philippines. There are 180,000 workers from the Philippines in Hong Kong. At the opening show, Mary Grace demonstrated how it only took 3 seconds to transfer money from Hong Kong to a family in the Philippines. The technology is based on Blockchain/DLT. Mary switches from Hong Kong dollars to GCash and then sent the money to the e-wallet (Wallet) of the family in the Philippines. The family can then quickly and easily switch from GCash to Philippine Pesos in the village. The bank Standard Chartered has participated throughout the entirety of the project.

## PREVALENCE

There are a few hundred thousand shops, bars, restaurants and online shopping websites that accept cryptoassets such as Bitcoin and other PDMs from around the world. A common factor among these is that they do not charge for payment in the PDM, unlike Visa, MasterCard and other infrastructures. This could, in the future, lead to a market in which it is more common to pay with PDM, as costs will be lower. According to a survey, it may also mean that PDM is more economically desirable to a greater extent. But today's huge volatility in the price of cryptoassets in particular causes many companies to decline them. The price of cryptoassets is largely driven by the fact that those who buy cryptoassets do so in the belief that others will buy the assets from them at a higher price, thus hoping for a profit (FOMO - Fear of Missing Out), pure speculation. As long as this is the mechanism of valuation, cryptoassets will maintain their volatile pricing in the future, as is the same with the principle behind stocks on the stock exchange.

## MONEY SUPPLY IN THE NEW ECONOMY

One interesting thing to explore is what might happen if Private Digital Money becomes a significant part of the global money supply, for example, if it contributed to 20% of the M1 money supply. For Norway, this would mean NOK 451 billion, while the commercial bank money will be NOK 1 803 billion (as of December 2018). As Private Digital Money in the future is not necessarily covered by deposits in fiat (central bank or commercial banks' money) but by other assets such as real estate, inventory, input factors in the industry or intangible assets, the money supply of PDM could, technically, quickly become as large as today's M1 money supply.

As described under Bitcoin generate some 19,8 million USD in “new” money every day.

If users, both private and corporate, get access to such interest-free money while accruing interest on commercial bank money (loans), most people would choose to take on loans through PDM if possible. Commercial banks' money printing would be reduced. If the endpoints (in store shops and online shopping) also accept PDM as a means of payment, it will soon grow to a complete financial ecosystem outside the current traditional monetary system.

But why would someone want to take on the risk of lending digital tokenized assets without demanding interest or any form of dividend? If those issuing Private Digital Money were platform companies such as Facebook, Amazon, Google, AliPay or WeChatPay, the motivation would be to give the public access to means of payment friction-free so that trade goes smoothly, as well as the ability to collect user/customer data. Companies can therefore provide the public with free money, without demanding interest. In 2018, American Express (Amex) launched a service for stores where loyalty coins can be obtained when trading and using cards. Thus, in principle, tokens are issued at a discount. One must bear in mind that there are no significant costs associated with issuing PDM, other than the risk of loan losses (if not covered by fiat money deposit). The platform companies don't want the public to save this PDM in a saving account, but rather motivate people to keep them in circulation. The BIS report mentioned earlier also concluded that credit risk scoring from Big tech outperform credit risk scoring of traditional banks.

#### RISK FOR FINANCIAL POLICY

If these new PDMs are used exclusively for payments with the principle of using fiat money to swap into the PDM, there will be no significant risk to financial stability or the ability of central banks to manage. The summary of PDM (based on fiat deposit) and old money in circulation remains unchanged. The money supply will remain as today. PDM is more or less the same as e-money, and the money supply is as before. Credit is given at banks' interest rates, which in turn are affected by the central bank's key rate. Everything is most likely to stay as before. However, if these new PDMs are also used to store value (savings) and investment for the future and possibly become the preferred accounting unit (what if the price tag in the store is in Bitcoin?) it could cause the central bank and government to have less ability to manage financial stability. Demand will be in the form of PDM and the central bank's interest rate setting will be less relevant to the money supply.

If the PDM is used in an infrastructure that replaces the banks' creation of money when based on a loan, by issuing PDM based on non-fiat items such as property, shares or otherwise, or as in Calgary, it may pose a threat to financial stability. In such a situation, the central bank cannot act as a "last resort" in a financial crisis, as NOK/Euro/USD is not part of the value chain. In 2019, this has become a real scenario, as new projects "tokenize" assets, like real estate. One example is the global stock exchange Nasdaq, which is working on plans to tokenize the shares on the stock exchange. These tokens can in principle function as a means of payment. According to the press, they initially plan to tokenize shares for \$600 million.

Bitcoin is another example. In Bitcoin a new block is created every 10 minutes or so, and each new block generates 12.5 new Bitcoins based on proof of work, not from fiat money but from electricity consumption. 12.5 times 6 per hour, times 24 hours per day, times 11,000 USD per Bitcoin (June 2019) equals 19.8 million USD increase in money supply every day, not swapped from fiat money.

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#### INVESTMENT & SAVING

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As the price of the PDM is 1: 1 in relation to Norwegian kroner, USD or Euro, the new money might not be used for saving if the interest rate is zero. There is no technical obstacle to yielding interest on a crypto asset or PDM, for either positive or negative interest rates.

Tokenization of shares, bonds, real estate and other assets may result in the issuing of a separate class of private digital money (PDM). These do not intend to be a means of payment, but rather a value retention that increases over time. I have already mentioned the job Nasdaq does for listed shares. But there are hundreds of examples from other industries.

Norwegian MIRIS is involved in a large number of real estate projects that tokenize the project cost instead of taking loans from banks. According to the newspaper, they started building on a building site in the Lier municipality in the spring of 2019, in which the financing was based on tokens rather than loans or pure share capital. In principle, one can imagine that these tokens could possibly be used to pay with, if there is a marketplace for it, and if there is liquidity in such a marketplace.



## THE NEW FRAGMENTED ECONOMY

Will it become one global PDM for all countries, or will it be a PDM per country?

Europe is a very fragmented part of the world. Germany earns its money on heavy industry such as cars, large machines and high-quality products that are expensive. Revenue does not vary so much from year to year. Italy and Greece, on the other hand, make their money on medicines, tourism, wine, olive oil, clothing, shoes, some cars and a few machines. Revenue can vary widely from year to year. The countries around the Mediterranean have a completely different business structure than the countries in northern Europe. Savings and investment patterns are also very different. This makes it very difficult to have one common currency, which the Euro experiment has shown.

It is possible that the money of the future will be local to each country, Europe included. It is also conceivable that there may be several different currencies within each country. Both Spain and Italy have large disparities between regions. For example, it may be appropriate for northern Italy to have its own currency, while southern Italy has another. The advantage of individual regions having their own currency is that the authority can control both interest rates and currency rate to a certain extent, and with that, the money supply and GDP, which thus contributes to directional economic stability. Or, for example, the Alps have a common currency that includes parts of France, Switzerland, Austria and Germany, which is a relatively homogeneous part of Europe.

With digital money, it is in principle no challenge to manage a large number of currencies. If you have "alpecoin" in your wallet and the store only accepts "Nordthcoin" the cashier will

automatically switch between the currencies to a second-updated currency rate. We, people, may find challenges with this system, for example if the price tag in the store is in "Nordthcoin", but it is still conceivable that a common global currency could be introduced to be used as a reference, and would be stated on the price tag. It doesn't even have to be a currency, it can be some kind of index, which all currencies are considered relative to.

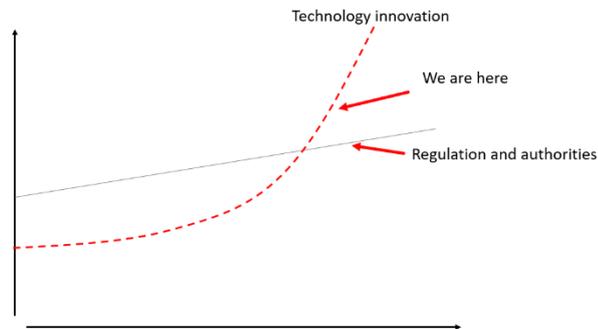
There are hundreds of local currencies today, such as Disney Dollar, Central Pound or Humbolt Hours. The advantage of such local currencies is that it contributes to more trade happening locally, which is good for the local community. With a technology like DLT and Blockchain, it's even easier to introduce local money, down to every city or village. With crypto exchanges it will be easy to switch a LondonCoin to a ParisCoin, and the flexibility is taken care of.

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## FINANCIAL AUTHORITIES AND REGULATION

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The regulatory authorities in all countries are dependent on innovation in the financial markets. The last financial crisis in 2007/2008 was largely a result of the subprime crisis in the US and is an example of what could possibly have been avoided with smarter regulation, even though technology was not at the centre of the issue. In the last 20 to 30 years, technology has developed faster than regulation can keep up with, and this gap is only increasing every single year. This means that the Financial Supervisory Authority and the financial authorities may need to adjust their regulation in a different way in the future, in order to ensure confidence in the financial system and in customer/investor protection. At the same time, history has examples of regulatory actions that have destroyed good innovations, many of which society could have benefited from; a balance between good regulation and continued innovation is challenging to find.

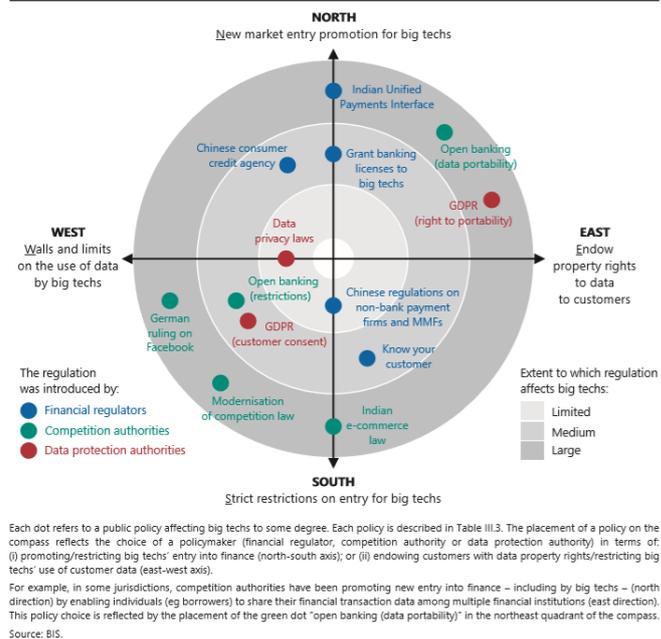


According to Marlene Amstad, who is on the board of FINMA, the regulatory authorities can take 3 stances on this new technology: 1) They can ignore cryptoassets and let this area be unregulated; 2) They can conduct the Howey test, also known as the duck test (if it looks like a duck, swimming like a duck and quacks like a duck it is probably a duck). Thus, for example, the security token (STO) regulates as a security that is already regulated; 3) The last option is to introduce a completely new type of regulation.

The Competitive Enterprise Institute conducted a survey in 2015 of the complexity of financial market regulation in the US. A total of 80,000 pages of text were sent from various regulatory authorities in the United States. The costs were estimated at USD 80 billion to implement. In 2017, I made a simple summary of the costs that Norwegian banks were likely to receive in connection with implementing the regulations, and concluded (certainly inaccurately) with an amount close to NOK 2 billion. There were IPS (new Individual Pension Savings scheme), AKS (Pension Share Savings Account), GDPR, PSD2 (Open Banking), IFRS9 and a couple of other regulation who came almost simultaneously. Who ultimately pays for these regulations? The customers, of course. One question in this context is whether the costs are possibly greater than the benefits? Do customers really want all this?

BIS (Bank for International Settlements) also called central banks bank, [issued a report June 21st](#) . They introduced a “compass” for financial authorities and regulation.

A regulatory compass for big techs in finance Graph III.8



To navigate the new, uncharted waters, regulators need a compass that can orient the choice of potential policy tools. These tools can be organised along the two dimensions, or axes, of a “regulatory compass” (Graph III.8). The north-south axis of the compass spans the range of choices over how much new entry of big techs into finance is encouraged or permitted. North indicates encouragement of new entry, while south indicates strict restrictions on entry. The second dimension in the compass spans choices over how data are treated in the regulatory approach. It ranges from a decentralised approach that endows property rights over data to customers (east), to a restrictive approach that places walls and limits on big techs’ use of such data (west).

### KISS (Keep It Simple, Stupid)

This is another term the regulators have trouble dealing with. Following the financial crisis in 2008, the Frank Dodd regulations were introduced in the US in 2010. Following the 1930s crisis, the Glass-Steagall Act was introduced, and later repealed in 1999 by Clinton after more than 50 years, an act that has been somewhat blamed for the 2008 crisis. The Glass-Steagall regulation was 848 pages, while the Frank-Dodd regulation is a total of 22,000 pages. The first Basel rules from the 1980s were 30 pages of text, Basel II was 347 pages, while the new Basel III is 616 pages. In addition, it is estimated in the EU that the introduction of Basel III consumes 70,000 man-years to put in production. And Basel IV will be introduced soon. The tax laws in the US are currently 74,000 pages long, up from 8,200 in 1945. The tax laws in Scandinavia seem like "management summary" with just over a thousand pages. Today, European banks have to fill in between 30,000 and 50,000 input boxes in 60 different online forms every year.

It may be an idea to learn something from the Christians' 10 commandments? There may have never been more bad banking and miserable judgment than now, despite all the pages dedicated to financial regulations. Danske Bank is accused of participating in major money laundering in the Baltic countries. Swedbank is accused of helping to launder €4 billion in the Danske Bank case. UBS has paid a fine of € 4 billion to have helped wealthy Frenchmen with tax evasion via secret accounts in Switzerland, the so-called “milk team” case. HSBC paid £2.9 billion for a similar case in France. UBS was sentenced to pay € 1 billion for the manipulation of the LIBOR course in 2012. Deutsche Bank have been involved in several cases in recent years. The British Standard Chartered Bank agreed in April 2019 to pay € 1 billion in fines for violating the AML rules to France and the United States, for money transferred to and from Syria, Iran, Burma, Zimbabwe, Cuba and Sudan. We had the Panama Paper case a few years ago where Norwegian banks were also involved. The list is, of course, much longer. It doesn't seem that a lot of text equals any more confidence in the banking regulations.

## Trust

It is absolutely crucial that people have confidence in their money and payment services. The banks have had a rough history, and without anyone who can "look into their books", confidence in many banks would probably be reduced. In this regard, the Nordic region is in a special position with great confidence in the banks. Up to 80% say they have confidence in the banks. Whilst in Africa, Asia and South America, confidence is very low, well below 50%.

There is no reason to assume that those involved in crypto assets and Stable coin are any better than the bank employees around the world today. It is therefore important to find a mechanism that helps to create trust and stability in the new economy. But does it need to be a central and ultimately super central (EU) organization? Is it possible with some form of self-regulation, like that of the medieval gauntlet principle? If so, who should report and who should judge?

As Professor Marlene Amstad points out in her document on CEPR, the "one size fits all" approach risks slowing down innovation and making it difficult for newly established companies. "One size fits all" is the principle used in the EU today. The EU has introduced PSD2 which aims to help smaller organizations enter the banking market to increase competition, to the advantage of the consumers. On the opposite side, GDPR regulation has led many banks and financial operations to hire large numbers of lawyers to make sure that they are compliant, while small organizations do not have the same resources and are therefore excluded from the market. There's also a risk for reduced innovation when banks hire more attorneys to be compliant, rather than hiring more IT people to drive innovation.

It also seems clear that the current financial supervisory authorities in most countries are not built for future requirements, so are not "future proof". The best way to establish regulation and supervision might be to establish a triangle collaboration between: 1) the regulatory authorities; 2) the public; 3) and the finance industry (not just banks but also Fintech), where all 3 parties have equal votes, and decisions are taken by consensus.

### Self-regulation?

Service providers in the new economy (read cryptoasset) depend on trust and demand regulation. However, there is a need to replace rule-based regulation with a situation-based regulation, as well as a need for a smarter type of regulation that differs depending on the size of the operation, so that small firms have the opportunity to compete on equal terms with larger ones, and to thus prevent today's oligopoly. Several cryptoasset companies in the US, Japan and Europe have proposed a regime where the participants themselves regulate the market. They want confidence as it generates more revenue.

### History of regulation



2) a driver 3) and a man who walked 100 meters in front of the car with a red flag to alert people

Flagman's regulation is possibly the most well-known form of bad regulation. The cars were "invented" in mainland Europe around 1900. In England, the automotive industry was becoming a major industry, developing far faster than in France and Germany. Yet at that time, the cars were still noisy machines that drove around on the muddy roads originally made for horses and carts, whilst spewing out exhaust. The cars often broke down because of technical problems, which would scare the horses. In England, they introduced a rule that each car needed to have at least 3 people onboard: 1) a mechanic who could repair the car every time it broke down

to the fact that a car was coming and that there would therefore be a lot of noise and a terrible smell. Thus, the cars could not drive faster than the flagman could walk. The result in England was that large sums were invested in trains and almost nothing in the automotive industry, and the United States took over the pace of innovation and the creation of millions of jobs.

In the 1970s, videos came into circulation and a competition emerged between Betamax, VCR and many other formats that set out to win the market. However, in the midst of this, the film industry believed that video recorders should be banned, as, according to them, their sole purpose was to create pirate copies of movies that film companies had the rights to. It became one of the biggest battles in the history of US law, eventually ending in 1985 with the Sony Corp of America case, in which innovation won and the film industry lost. Shortly after this, the music industry attacked tape/CD players in the same way, believing they would copy songs from the radio. Today, the film and music industry receive up to 70% of its revenue from Spotify, Netflix and other streaming services.



With the creation of the internet in 1990, the SESTA/CDA230 case emerged. The question revolved around who should be responsible for what was written in forums, blogs and other online spaces on the web. Many believed that each platform should be responsible for its content, while others thought this would kill innovation. In 1996, the Communication Decency Act was adopted in the United States. It concluded that it is the person who creates the content that is responsible for what they share and not the service provider/platform. This made it possible for Facebook to develop. It enabled Google to buy YouTube. It made it possible to create Twitter, Instagram, Airbnb and Uber and a variety of similar innovations to contribute to a wide-scale change of our every-day lives for almost everyone around the world.

I worked with financial advisors in England in 2007. At that time, new regulations were on the way to ensure confidence in the financial system and investor protection, after many cases where an "adviser" had sold unsuitable "investments" to private individuals without adequate expertise. The key word for English advisors aiming to get new customers was "independent", such as an "independent financial advisor". Instead of a rule-based regulation by banning, the FSA implemented a regulation where the word "independent" can only be used if 80% of the revenue came directly from the customer and not the kickback from the mutual fund provider. In addition, they created a compensation fund that paid to those who thought they were treated incorrectly, but only if the advisor was regulated and was declared "fit and proper" by the FSA. The result was that all the cowboys and the dishonest advisors disappeared out of the market relatively quickly, as the customers chose to go to those who had "everything in order". A form of self-fulfilling regulation where the FSA retrieved and channelled the energy from the market place.

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## CENTRAL BANK AND AUTHORITY ROLE

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Society needs a "last resort". We will be involved in various financial crises from time to time in the future. During these crises, we need someone with the designated task of trying to limit the damage, whilst making sure that trade continues as smoothly as possible, contributing to financial stability, and ensuring that as many as possible can retain income for their family and can still bring food to the table. Thus, we need an organization that has both authority and is sufficiently independent to do that job. This "last resort" must have the sufficient tools for the task.

We are also likely to find that a time comes when we may suffer from an electricity outage, or that the electricity is shut down for a certain period of time, with one consequence being that the internet stops functioning as well. We may eventually experience a war that affects our region or

another kind of serious event. In such cases, society must have a mechanism in place that helps us continue to provide food and drink, work, and the means to survive.

The central bank should, today and also in the future, have an important role prepared for such crises.

Today, the central bank contributes to financial stability through interest rate, which in turn affects the demand for credit, resulting from a willingness to invest. In the future, it should be an independent organization that affects the supply and demand of credit and with that the money supply, so long as the consideration of what is best in the long-term for society as its only driving force. Such an organization should not be controlled by the market alone. The question raised in this document is whether today's tools are sufficient for such future challenges, and especially when introducing PDM and/or cryptoassets.

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## WHAT MIGHT HAPPEN?

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To conclude where this report starts, by returning to the question of what can happen when Private Digital Money becomes a significant part of the economy, here are some more examples. I have already described and considered a number of possible scenarios for if, or possibly when, this happens. These are just some examples that I have not touched upon so far throughout this study.

**Payments.** If most payments are made with PDM, the usage of our current infrastructure with SWIFT, mobile banking or online banking payments, settlement and Central Bank of Norway net (possibly gross) settlement will reduce. It will probably mean that banks can, in the long run, decommission many of their old computer systems, and with that save hundreds of millions of dollars. Customers receive faster and cheaper payments, even across national borders.

Cash is likely to be irrelevant as a means of payment in physical stores in the future, at least in mature economies. However, cash is likely to remain in use in the event of a crisis. Many claims that cash will still exist in 100 years.

**Consumer credit.** Credit card debt and payday loans pose a challenge in maintaining financial stability throughout the Western world. The wave of tokenization we see today makes it possible for the PDM to be issued based on something other than fiat money. In that case, it may be conceivable that the need for payday loans may be reduced, or that the security of the lender will improve and with that, the interest rate would lower.

**New financial services.** DLT/Blockchain technology offers the opportunity to develop brand new financial services based on smart contracts, with the added bonus of eliminating a counterparty risk with atomic type transactions. Many services such as these cannot be developed based on fiat money and traditional technology. The technology makes it impossible. The result may be that the PDM becomes the infrastructure of a new financial ecosystem.

**Barter?** In the future, as today, the public will want the opportunity to buy something they do not have the money to buy (like car or house), and will thus need loans and credits. The technology will hardly change these basic needs. But the fact that what society deems as valuable is likely to change with new technology and the ability to transfer value between one another, not just money, will then change the need for credit. In my book, "Money: From Caveman to Robot", I have argued that we are moving towards a world of bartering, as new technology such as DLT can easily scale barter. For example, I could swap 5,000 likes on Facebook for a taxi ride in Trondheim, and money is not involved. The value is also highly uncertain, as 5,000 likes can be worth far more to the taxi driver than a taxi ride for me. In such an economy, the need for credit may be reduced.

**Large company's PDM.** It may seem impractical that there are many different PDMs. However, it would technically be possible for IKEA to have their own IKEACoin while Coop has its own CoopCoin. The price in the stores can either be stated in NOK or in an index, so it is possible to compare the prices from one store to another. The cash register can easily convert your payment method, with a rate of 1,1 CoopCoin equalling 1 IKEACoin. The benefit program TRUMF and Coop member would be built into the PDM as well. In such cases, it is not just the technology companies that create PDM, but also large companies that have customer confidence. What happens if these companies go bankrupt?

**Reduced costs and faster payment.** As of January 1, 2019, payments both in Norway and internationally are expensive and slow. In Europe, work is underway with TIPS, and Swift has launched GPI. All this to deliver fast and cheap payment. As payment in today's infrastructure requires the engagement of computer systems in 2 to 3 banks, a DLT based infrastructure is likely to be even cheaper and faster, as the transaction is P2P and only one operator is needed to verify the transaction.

**Centralized or decentralized.** Both the current and the planned future infrastructure is based on a number of single points of failure. Units that are put out of service will stop the entire payment system. Substantial amounts have therefore been invested in backup and redundancy. In the classic Blockchain architecture, the transaction history is distributed, as is the consensus mechanism, so there is no single point of failure, thus improving stability and increasing security.

**Private and sensitive information.** In recent years, we have experienced a large number of data breaches where sensitive information for hundreds of millions of people has gone astray, including breaches from banks. A common link in all of these breaches is that the information has come from a centralized computer system. DLT offers a decentralized infrastructure that has a greater ability to prevent such large-scale theft. Newer DLT technology also combines open (public) networks with a simple customer interface, as well as the security of private (permission only) networks, enabling the authorities to track and uncover, while keeping private information private.

**Disadvantages.** DLT/Blockchain as a technology obviously has disadvantages as well. A) The power consumption as aforementioned. B) There is also a risk that it is possible to "fork" a token, which means that the chain of transactions splits into two at a specific time, as when Bitcoin and Bitcoin cash split. C) In the earlier technologies that Bitcoin was scaling, the number of transactions per second was causing a problem, but this has since been solved in recent technological developments. D) It has been possible to steal tokens by hacking the server that the hot wallet is stored on.

Let's imagine that we are in Oslo in 2030. It is summer and the sun is shining. Per is 25 years



old and has just graduated from business school a month ago, but has already got a job with a good salary. He has bought an apartment close to the Opera House in Oslo for NOK 8 million. He bought his apartment at the BoMark marketplace. BoMark launched their marketplace in 2025 and based the entire value chain on the DLT (Distributed Ledger Technology). Per chose to let BoMark tokenize his apartment, which meant that he did not have to take out a loan from a bank. BoMark has tokenized close to 760 apartments for almost NOK 6 billion. They

have then ensured that these tokens are registered on several crypto exchanges, such as the US based Coinbase, the Swedish Saffelo, the Norwegian BitGate and a few others. The result of this is that it only takes a few seconds to buy or sell these tokens, which you can do any time of the day.

Per buys the token in their own apartment for NOK 300,000, which is the amount he has saved up. He plans to buy the token in his own apartment for NOK 20,000 a month until he owns his apartment completely. It's an old-fashioned way of thinking, but his father always said it's good to be debt-free. Buying a token in apartments in San Francisco or Singapore may be smarter as the house prices are likely to rise more than in Oslo, but being debt-free is a priority.

Tokenization of apartments works almost like an old-fashioned real estate fund. Each coin or token rises in value whilst the prices of apartments also rise in value. Those who buy such tokens are thus following the increase in the value of the apartments. Twice a year, all apartments are assessed by an approved real estate agent and the price of the token is distributed. But, if BoMark's apartment is perceived better than others, the price of the BoMark token will be higher than the assessed value would indicate, as it expects better price increases in the future.

For Per, tokenization implies that he does not have to raise loans at the bank and he therefore does not have to pay interest. What he would've originally had to spend on interest, he can now spend on buying the token in his own apartment. The only drawback is that he does not participate in the entire value increase in his apartment other than for the token he owns.

There is no need to pledge/pay for collateral on anything as he does not have a loan. Nor is there a need for a central registration of the ownership of the apartment as previously documented in the central ownership book. The ownership is located in Per's wallet.

The only loser here is the bank that no longer gives loans to customers. And when there's no longer customers to take out a loan, the old system of "printing" money then breaks down, as mentioned earlier in this document.

### A First For Manhattan: \$30M Real Estate Property Tokenized With Blockchain



Rachel Wolfson Contributor  
Crypto & Blockchain  
I write about crypto, women in crypto and blockchain technology.

#### TWEET THIS

- Tokenization is paving the way for a new forefront in real estate development." Serhant told me.
- With proper discipline and respect, the future is bright for tokenized securities



A luxury Manhattan condo development located on 436 & 442 E 13th St in the East Village is the first major asset in Manhattan to be tokenized on Ethereum. [serhant.com](#)

A luxury Manhattan condo development is getting a new digital home on the worldwide Ethereum blockchain. The building, a completed 12 unit construction with 1700 sq ft units located on 436 & 442 E 13th

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