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„Should currency be denationalised in favour of competing digital currencies? F. A. Hayeks argument adapted and revisited in the digital age.“

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On my honour as a student of the Diplomatische Akademie Wien, I submit this work in good faith and pledge that I have neither given nor received unauthorized assistance on it.

Abstract:

This Master thesis provides a comprehensive analysis of the advantages and risks of a fully denationalized digital currency system. I express skepticism of F. A. Hayek's argument to denationalize currency. I am especially wary of the leap of faith F. A. Hayek gives to private institutions. After adapting his proposals to a digital environment, I construct two different scenarios. These scenarios draw upon real world examples. They differ in the functioning and governance of the corresponding currency. Based on this evaluation I highlight benefits and threats stemming from the distinguishing features. I deduce that a denationalization could help in tackling inflation. At the same time, it can cause bigger problems such as strong centralization, company malpractice, democratic backsliding, and a decrease in financial inclusion. I conclude this thesis with several proposals on how these effects can be managed and what laws should be implemented to preserve financial inclusion, democracy, and fair competition.

Key words:

Crypto-currencies, denationalization of money, Friedrich August von Hayek, central banks, CBDC, Bitcoin, Blockchain, Governance, financial inclusion, democratic backsliding, oligopolies

Abstrakt:

Diese Masterarbeit stellt eine umfängliche Analyse der Risiken und Chancen eines Währungssystems dar, welches komplett entstaatlicht ist und auf digitalen Währungen basiert. Der Wert und die Stabilität der einzelnen Währungen hängt in diesem System von Wettbewerb und Marktverhalten der Währungen ab. Diese Arbeit ist skeptisch gegenüber den von F. A. Hayek vorgebrachten Argumenten Währungen zu entstaatlichen. Sie ist insbesondere skeptisch in Bezug auf den Vertrauensvorschuss den F. A. Hayek privaten Institutionen gibt. Nachdem F. A. Hayeks Vorschläge an die digitale Welt angepasst wurden, werden zwei Szenarien konstruiert. Diese Szenarien basieren auf Handlungen und Ereignissen, die man in der Vergangenheit gesehen hat. Diese Szenarien unterscheiden sich in Funktionsweise, Kontrollmechanismen, und Governance der korrespondierenden Währung. Basierend auf diesen Szenarien werden Vor- und Nachteile der unterschiedlichen Funktionen aufgezeigt. Das Ergebnis ist, dass ein entstaatlichtes Währungssystem in der Begrenzung von Inflation helfen kann. Gleichzeitig wird klar, dass ein solches System größere Probleme verursachen kann, z.B. Zentralisierung, Monopolbildung, "democratic backsliding", und ein Rückgang finanzieller Inklusion. Diese Arbeit endet mit Anregungen welche Gesetze implementiert werden könnten, um finanzielle Inklusion, demokratische Prinzipien und faire Wettbewerbsbedingungen zu gewährleisten.

Schlagwörter:

Kryptowährungen, Denationalisierung von Währungen, Friedrich August von Hayek, Zentralbanken, CBDC, Bitcoin, Blockchain, Governance, finanzielle Inklusion, democratic backsliding, Oligopolisierung

Contents

1) Introduction	7
a) Research question	9
b) Thesis	9
c) Why ask this question?	9
2) Structure	12
3) Literature Review	13
4) Definitions	14
a) Money, currency, and a very brief history of money	15
i) Money.....	15
ii) Fiat Money	16
iii) Currency.....	16
iv) Monetary policy	17
v) A brief history of money	17
b) Seigniorage.....	19
c) Legal tender.....	19
d) Inflation and deflation	20
i) Inflation.....	20
ii) Deflation.....	21
e) Distributed Ledger Technology, Blockchain, proof of stake and proof of work, forks, DAO 21	
i) Distributed Ledger technology (DLT).....	21
ii) Blockchain	21
iii) Cryptocurrency.....	22
iv) Proof of work (POW).....	22
v) Proof of stake (POS).....	23
vi) Decentralized Autonomous Organization.....	24
vii) Fork	24
f) Gatekeeper.....	24
5) Problems with our monetary system according to Hayek.....	25
6) Solutions put forward by Hayek.....	27
7) Two scenarios.....	29
a) Common features of the 2 scenarios.....	30
i) Hayek's propositions.....	30
ii) Future of Blockchain	31
iii) Wallets	32
iv) Everyday usage.....	33

v)	Security concerns	34
vi)	Taxation, seigniorage and settlement	36
vii)	Energy efficiency	38
viii)	Know your customer rules	39
b)	Scenario a); a decentral approach	41
i)	Chances.....	43
(1)	No more inflation?	43
(2)	Monetary policy	44
(3)	Transparency increase?	46
ii)	Problems.....	47
(1)	Governance.....	48
(2)	Efficiency.....	51
(3)	Motivation of this currency?.....	51
(4)	Financial Inclusion	52
(5)	Conclusion.....	53
c)	Scenario b); a central approach	53
i)	Chances.....	54
ii)	Problems.....	56
(1)	Meaningful investment	56
(2)	Governance.....	57
(3)	Centralization.....	59
(4)	Gatekeeper in a digital world.....	60
(5)	Motives.....	61
8)	Necessary Regulation	61
a)	Competences	62
b)	Changes	62
i)	Abolishing legal tender laws.....	62
ii)	Regulatory necessities.....	63
(1)	Disclosure of algorithms.....	63
(2)	Ensuring interoperability	64
(3)	Monopolies.....	65
(4)	Governance.....	66
(5)	Financial Inclusion	66
(6)	Other regulation needed	67
9)	Conclusion	67
10)	Bibliography.....	69

1) Introduction

“History is largely inflation engineered by government”.¹ With this analysis Friedrich August von Hayek begins his considerations on money. He offers a radical solution to the problem of inflation and monetary crises. His solution is the abolishment of state control over currency and the denationalization of money.

Due to the Covid-19 Pandemic and the war against Ukraine people around the globe are experiencing sharp price increases.² Inflation in the Eurozone has risen to 8,1% in May.³ Pictured in Figure 1 we see a strong increase in inflation rates in several countries.



Fig. 1 Current Inflation rates around the world.⁴

¹ Friedrich A. Von Hayek, *Denationalisation of Money: The Argument Refined*, 3rd Edition (London: Coronet Books Inc, 1990), 33.

² Christian Siedenbiedel, “Hans-Werner Sinn und Lars Feld: „Die Inflation ist da – und wird auch bleiben“,” *FAZ.NET*, accessed April 7, 2022, <https://www.faz.net/aktuell/finanzen/lars-feld-und-hans-werner-sinn-sprechen-ueber-inflation-17939867.html>; “Inflation in the Euro Area,” accessed April 7, 2022, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Inflation_in_the_euro_area; Howard Schneider, “New Index Shows U.S. Inflation Expectations Shifting Higher,” *Reuters*, March 8, 2022, sec. Business, <https://www.reuters.com/business/new-index-shows-us-inflation-expectations-shifting-higher-2022-03-08/>.

³ Liz Alderman, “Eurozone Inflation Hits Its Highest Level since the Creation of the Euro in 1999,” *The New York Times*, May 31, 2022, sec. Business, <https://www.nytimes.com/2022/05/31/business/eurozone-inflation.html>.

⁴ “Inflation, Consumer Prices (Annual %) - United States, Germany, Brazil, South Africa, Thailand | Data,” accessed May 30, 2022,

Central banks have signaled that they recognize the problem and act accordingly.⁵ It remains to be seen whether these measures will be successful. Instead of monetary policy F.A. Hayek came up with a more radical solution to inflation. In the 70ies when he wrote and published his book “Denationalization of Money – The Argument Refined”⁶ there was global increase in prices depicted in fig. 2.

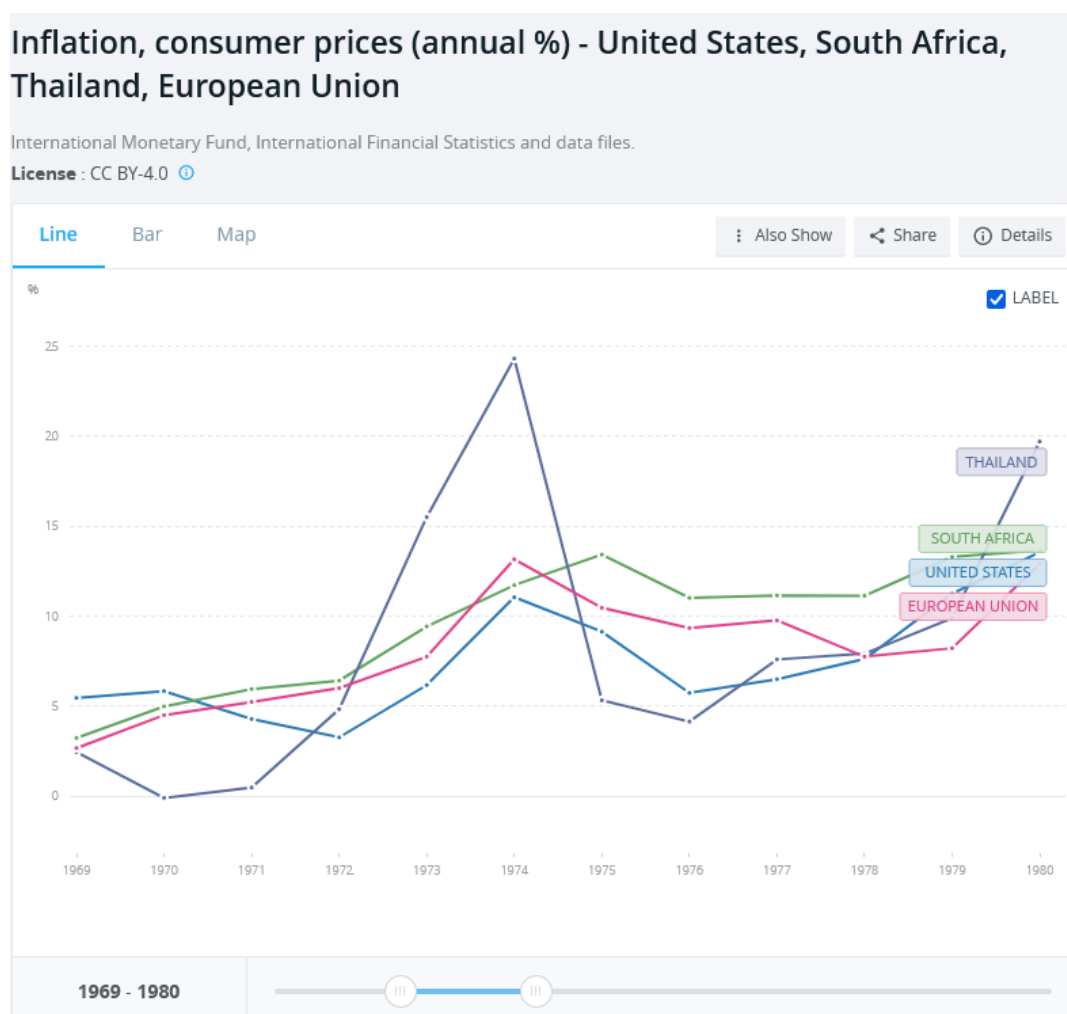


Fig. 2 Inflation rates during the 70ies⁷

<https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?contextual=default&end=2021&locations=US-DE-BR-ZA-TH&start=2018&view=chart>.

⁵ “War in Ukraine Unlikely to Deter ECB From December Rate Hike,” *Bloomberg.Com*, April 8, 2022, <https://www.bloomberg.com/news/articles/2022-04-08/war-in-ukraine-unlikely-to-deter-ecb-from-december-rate-hike>; Jeff Cox, “Powell Says ‘inflation Is Much Too High’ and the Fed Will Take ‘Necessary Steps’ to Address,” *CNBC*, March 21, 2022, <https://www.cnbc.com/2022/03/21/powell-says-inflation-is-much-too-high-and-the-fed-will-take-necessary-steps-to-address.html>.

⁶ Hayek, *Denationalisation of Money*.

⁷ “Inflation, Consumer Prices (Annual %) - United States, Germany, Brazil, South Africa, Thailand | Data.”

Hayek attributed that to the unrestrained issuance of money. To restrain states in their monetary policy Hayek wanted to denationalize currency. He argues that the people and the economy would profit from a denationalization of money. States should give up their control over money. When F. A. Hayek wrote his book this seemed like a distant reality. Today there are digital “currencies” being used already. Bankers and regulators often stress the risks. The chances are seldom discussed. Therefore, I want to ask the following research question.

a) **Research question**

Would the denationalization of state-controlled currencies help overcome problems of the monetary sector or is such denationalization in favor of competing digital currencies a bad idea?

b) **Thesis**

I will base this research question on Hayek’s thesis that a denationalization would help overcome economic stagnation, state abuse of the monetary system and the political conflicts such abuse causes. To Hayek only a complete denationalization could efficiently solve the problems he analyzed. A competition between currencies distributed by institutions acting out of self-interest would solve this.

I want to analyze if the chances of competition between denationalized currencies outweigh the risks. I will adapt his argument to the world of the 21st century. This means that I will assess the advantages and risks of a market of private digital currencies. Today there are already several “currencies” circulating which are completely digital. It seems likely that the digitization of the monetary system will only accelerate. The chances and risks of digital currencies are different than the ones envisaged by Hayek. Digitization has encompassed all areas of our everyday life. Digital technology is only going to entrench itself deeper in all parts of our society. I believe that our payment and currency system will grow increasingly digital. For analyzing Hayek’s vision in today’s time, I am going to focus my assessment on digital currencies.

c) **Why ask this question?**

This question should be asked as we are increasingly seeing the impacts of several external crises on the monetary system. The inflation we are currently

seeing can be attributed to several factors.⁸ Hans-Werner Sinn attributes the current rise in prices not only to lax monetary policy. He argues that the pandemic and the global response is the main cost driver. Especially the lockdowns and zero covid approach in the Peoples Republic of China. The policies in the PRC delay the production and transportation of goods.⁹ The squeeze at ports and factories caused an eightfold increase on container shipping prices.¹⁰ Other reasons which contribute to the price increase are the spike in energy prices, the boom in construction and the increase in national debt around the world.¹¹ The boom in construction and the ongoing increase in debt raises demand. A demand with which the suppliers can't keep up causing prices to rise. Increasing national debt and monetary supply to stimulate the economy by creating more demand does not help with keeping prices down.¹² The overall driving factor for the rise in prices is the limited supply of goods.¹³ Increasing monetary supply and national debt creates even more demand to a supply that cannot keep up. As reaction to this companies have started hoarding goods and materials. Along with the wage price spiral these effects are self-energizing and contribute to further price increases. The reaction to the Russian war will only make this worse.¹⁴ Central banks have in the years after the GFC resorted to lax monetary police to spark growth. This however did not achieve the result initially hoped for. Now we see these measures having a negative effect on the price level and especially the lives of people around the globe.

On the other hand, the digital revolution is causing disruptions in all areas. Everyday life has been changed by the digital revolution. Now the monetary sector is seeing a rise in new technologies. This started with the digitization of bank transactions and the stock exchange. It gave rise to online payment services like PayPal, Venmo and WeChat. Digitization of payments may seem like a big deal but compared to what might lie ahead it is minor.

⁸ Österreichische Akademie der Wissenschaften, *ÖAW-Lecture Hans-Werner Sinn: Die Neue Inflation, 2022*, https://www.youtube.com/watch?v=C6cd9WXk_hU.

⁹ Österreichische Akademie der Wissenschaften.

¹⁰ Österreichische Akademie der Wissenschaften.

¹¹ Österreichische Akademie der Wissenschaften.

¹² Österreichische Akademie der Wissenschaften.

¹³ Österreichische Akademie der Wissenschaften.

¹⁴ Österreichische Akademie der Wissenschaften.

The concept was not completely new, cryptographic technology had been proposed as a base for a digital currency in the 90ies.¹⁵ But the breakthrough of the proposal came in 2009 when Bitcoin was released.¹⁶ A completely digital, decentralized, secure “currency”. A “currency” not controlled by a state or state institution but by a community of individuals who participate in the project. Since then, Bitcoin, blockchain and crypto “currencies” have been hyped as the most disruptive technology of the 21st century. They have been belittled as mere nerd gimmick. I do not believe that either of these extremes will hold true. We have seen them grow in popularity over time as depicted in Fig. 3 with an enormous uptick during the Pandemic.

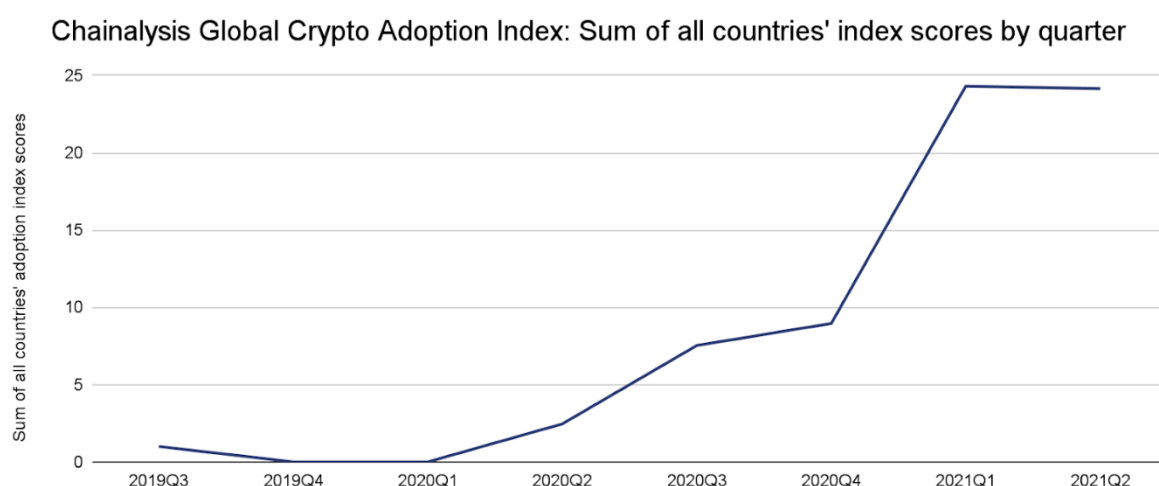


Fig.03 Depicting the “adoption index” which measures the rate of Crypto currency adoption around the world¹⁷

These graphs show that we see at least partial adoption. But in the report, it is recognized that the adoption hadn’t had the far-reaching effects sometimes described.¹⁸ It is hard to argue that these new technologies will have no impact at all. Whether this will be because they cause states to reconsider (restructure) their monetary systems or because individuals will increasingly use these currencies rather than state-controlled ones.

¹⁵ “FAQ - Bitcoin,” accessed April 8, 2022, <https://bitcoin.org/de/faq#wer-hat-bitcoin-erfunden>.

¹⁶ Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System,” n.d., 9; “FAQ - Bitcoin.”

¹⁷ “The 2021 Global Crypto Adoption Index: Worldwide Adoption Jumps Over 880% With P2P Platforms Driving Cryptocurrency Usage in Emerging Markets,” Chainalysis, October 14, 2021, <https://blog.chainalysis.com/reports/2021-global-crypto-adoption-index/>.

¹⁸ “The 2021 Global Crypto Adoption Index.”

The question I am asking in this thesis is important because the stress on the monetary system is increasing. Meanwhile digitization is progressing rapidly. With new possibilities emerging these two processes could be intertwined. Many states have acknowledged these developments recently. Some implemented digital currency policies such as El Salvador where Bitcoin has been declared legal tender.¹⁹ On the other end lies China where all crypto currency activities have been declared illegal.²⁰ I want to look at chances and risks that come with a deeper integration and maybe total adoption of cryptocurrencies for our everyday life.

2) Structure

After this introduction I will give an overview over the literature used in this thesis. Following the literature review, I will explain some definitions and concepts. These are necessary for a better understanding of the topic and Hayek's proposals. This will include definitions of currency and money, legal tender, and technical concepts such as blockchain and crypto currencies. With definitions at hand, I will summarize which problems Hayek analyzed as crucial in our monetary system. Hayek describes problems such as inflation, deflation, and government abuse. I am going to look if these problems persist today. After outlining the problems, I will illustrate the solutions offered by Hayek. I will outline his propositions for a currency market without state control. I will describe why according to him it would solve the previously described problems. Then I am going to outline how Hayek envisaged this project to work. Hayek wrote his book in the 70ies. Today the technological possibilities are vastly different. I will describe two fictitious scenarios. Both have a digital currency at their core. They differ by their approach to the currency at its core. Based on these scenarios, I will analyze risks and chances of Hayek's proposal if they were to be translated to the 21st century.

I am going to adapt them so that they apply to crypto currencies. This will contain

¹⁹ Tjerk Brühwiller, "El Salvador: Ein Präsident im Bitcoin-Rausch," *FAZ.NET*, accessed May 30, 2022, <https://www.faz.net/aktuell/politik/ausland/el-salvador-praesident-setzt-bitcoin-als-zahlungsmittel-durch-17750777.html>.

²⁰ Martin Hock, "Verbot in China: Bitcoin lässt sich nicht beeindrucken," *FAZ.NET*, accessed May 30, 2022, <https://www.faz.net/aktuell/finanzen/chinas-verbot-von-krypto-anlagen-bitcoin-ist-unbeeindruckt-17557892.html>.

explanations on technical proposals for crypto currencies. I will contrast currencies which are controlled by a community against ones which is controlled by a private entity such as a bank or tech corporation.

This technical explanation will be followed by an assessment of the chances that such a transformation could bring.

After the chances have been highlighted, I will look at possible threats. Here I will describe what the motivators for private individuals to distribute crypto currency could be. Within each of my scenario I will discuss different threats and chances. After this assessment has been concluded I will make some propositions on legal measures which could be implemented. I am going to look which regulations are already in place in the EU. Most measures are aimed at ensuring effective workings of the market. I will try to draw parallels from the measures already in place. How could they ensure functioning and participation in a European market of denationalized currency? If no rules fit, I will come forward with some own suggestions on rules which should be implemented.

I will end this thesis with a conclusion and a thorough answer to my research question.

3) Literature Review

I will most prominently use F. A. Hayek's book the denationalization of money itself. I will also draw upon "The Bitcoin Standard" as well as "The Fiat Standard" by Saifedean Ammous to give background and depth to Hayek's and my arguments.

To understand the scope of the problem I am going to explain what a currency is. What its attributes are and how they work. Here I am going to give a brief history of privately issued currencies and state-controlled ones. What have been the benefits and what the disadvantage of each of the ones. I will look at the history Hayek offers of state currency. This work shall not focus on inflation or the history of money itself. It is necessary to briefly look at inflation, its history, and the basic workings of inflation. They need to be understood. Hayek names several reasons for inflation, I will outline what his conclusions are.

I will use existing literature on the role and governance of money. What functions does a currency need and what rules should be abided. Literature for this include legal publications but also theoretical approaches.

Hayek's ideas have received a lot of feedback. Hayek is often praised within the crypto "currency" community as saint and savior of a just, democratic, and independent monetary system.

Hayek is regarded as father of the concept of private "currency". He has received a lot of feedback from scholars and bloggers also regarding his ideas and their application to crypto currencies. One scholar that offers interesting ideas and supplemental knowledge to Hayek's proposals is Dr. Adam Tebble²¹ of the Kings College. He published a paper which addresses the question whether crypto currencies constitute that kind of denationalization that Hayek envisaged.

As already mentioned, the rise of crypto currencies has been recognized by central banks around the globe. Thus, many of them have published, statements, research papers and policy proposals. I will especially look at reports made publish by the ECB. I will focus on statements and research publications made by European organizations as I want to assess how private currencies could disrupt the EU and its institutions. However, within the EU the individual national banks also publish research and statements. I will take these into consideration to see what the arguments are of the ones currently controlling currency. They will need to argue and explain why it should remain that way. Central bankers and politicians' statements should be looked at to address these concerns.

4) Definitions

In this work I will dive into different concepts of payments and corresponding legal and technical mechanisms. To understand the interplay between technical, legal, and financial matters I will now give important definitions. These shall provide a minimum common standard on which I will build my argument. I am going to explain the distinction between currency, money, and fiat money. Then I will explain what seigniorage is. What is monetary policy? In this work I already offered a brief history of money. Such history would not be complete without inflation. The term inflation is among the most used ones in current news but what does it mean and how can it be defined? I will contrast inflation and deflation. When Hayek wrote his book the possibilities the Internet offers were unthinkable. If one would explain the internet

²¹ "Friedrich Hayek: Prophet of Cryptocurrency? - Centre for the Study of Governance & Society," accessed January 19, 2022, <https://csgs.kcl.ac.uk/friedrich-hayek-prophet-of-cryptocurrency/>.

to people living in Hayek's times, they probably would struggle to understand it. A similar imbecility can be found today when it comes to crypto currencies, Distributed ledger technology, blockchain and decentralized autonomous organizations (DAO). For this work it is necessary to understand the rudimentary functions and differences of each of the terms used. There is an abundance of literature offering deep insights into the technical workings of blockchain and crypto currencies. I am going to try to explain where the concepts of blockchain and Crypto currency concur and where they differ. I will keep this explanation simple to stop it from getting too technical or complicated. Finally, I will describe what a gatekeeper is. This is important as the gatekeeper phenomenon could affect the private currency market.

a) Money, currency, and a very brief history of money

i) Money

What is money and what functions does money have? Money is an item used in a transaction between two or more parties to imburse the person offering a good or service. It is a medium of exchange.²² Money in the past consisted mostly of commodity money. This was then replaced by precious metal coins and later paper money which could be redeemed against precious metal. Today we mostly use fiat money. Central banks try to keep the value of money stable so that people continue to trust the central bank and thus the value of paper money. To be considered money the items used need to fulfill certain criteria.

Today there are three criteria which money should have. First it is necessary that it can be regarded as store of value. The designated money must keep its value over time so it can be used as savings for the future. It must also function as unit of account; it helps to keep track of value gained or lost and compare the value of goods and services. To qualify as money, it is necessary that it serves as universal means of exchange. Only due to its universal

²² Nigar Hashimzade, Gareth Myles, and John Black, "Money," in *A Dictionary of Economics* (Oxford University Press, 2017), <http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-2014>.

acceptance money can be used to overcome the double coincidence of wants problem of barter economy.²³

ii) Fiat Money

Fiat money is the money we use every day whether they are called Euro, Dollar, Renminbi or Yen. Fiat money is not backed by a physical commodity. It has value because it is commonly accepted.²⁴ This is called exchange value.²⁵ It is commonly accepted because it is backed by the government which issued it. Fiat money are banknotes/coins/bank account credit which have no intrinsic value. In principle it is worthless. It is issued by a corresponding central bank, and it is declared legal tender.²⁶ There are legal tender laws in place which force parties to accept the corresponding money. The governments do not hold significant reserves of resources to give value to the money. It merely means that the government is willing to take actions which secure the “value” of the currency. Central banks are free to decide how much they issue and in theory they have great control over the economy.²⁷

iii) Currency

The Cambridge Dictionary defines currency as “the money that is used in a particular country at a particular time”.²⁸ The Oxford Dictionary of Economics describes currency as being “another name for money usually applied in the context of international trade”.²⁹ These definitions aren’t helpful as it explains the concept of currency with another concept which is the one of

²³ European Central Bank, “What Is Money?,” European Central Bank, November 18, 2021, https://www.ecb.europa.eu/ecb/educational/explainers/tell-me-more/html/what_is_money.en.html; “Money Definition,” Investopedia, accessed April 4, 2022, <https://www.investopedia.com/terms/m/money.asp>; Author removed at request of original Publisher, “24.1 What Is Money?,” June 17, 2016, <https://open.lib.umn.edu/principlesofeconomics/chapter/24-1-what-is-money/>.

²⁴ Nigar Hashimzade, Gareth Myles, and John Black, “Fiat Money,” in *A Dictionary of Economics* (Oxford University Press, 2017), <http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-1175>.

²⁵ Hashimzade, Myles, and Black.

²⁶ Bank, “What Is Money?”

²⁷ “What Is Fiat Money?,” Investopedia, accessed April 4, 2022, <https://www.investopedia.com/terms/f/fiatmoney.asp>.

²⁸ “currency,” accessed April 4, 2022, <https://dictionary.cambridge.org/de/worterbuch/englisch/currency>.

²⁹ Nigar Hashimzade, Gareth Myles, and John Black, “Currency,” in *A Dictionary of Economics* (Oxford University Press, 2017), <http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-684>.

money. Currency is better defined as a medium of exchange for goods and services. It is usually issued by a government and circulated in the jurisdiction of such government.³⁰

But this does not go far enough either. The Encyclopedia Britannica offers a comprehensive definition of currency. They use the term money in their definition. Currency is a portion of the national money supply. It consists of bank notes and government issued paper money and coins. But currency can also be any item which is used as exchange media.³¹ In the past governments were obliged to repay the holder of currency in precious metal this isn't the case anymore. The abolishment of the gold standard in the 30ies has done away with this.³²

iv) Monetary policy

Monetary policy is one of the two tools available to government institutions (mainly central banks) with which they can shape and influence overall economic activity in the corresponding country.³³ This economic activity comprises output, employment, and the development of prices.³⁴ These policies are mostly carried out via central banks. Commercial banks can hold claims against the central bank or the central bank loans out money to the commercial banks. As the central bank itself can set the conditions for these claims it controls the money and credit circulating in an economy.³⁵ Different central banks pursue different monetary policies with different measures. The ECBs primary objective is maintaining price stability.³⁶

v) A brief history of money

How did we arrive at the understanding of money and currency we hold today? Before there were coins there was commodity money. Instead of

³⁰ "What Is Currency?," Investopedia, accessed April 4, 2022, <https://www.investopedia.com/terms/c/currency.asp>.

³¹ "Currency | Economics | Britannica," accessed April 4, 2022, <https://www.britannica.com/topic/currency>.

³² "Currency | Economics | Britannica."

³³ Benjamin M. Friedman, "Monetary Policy," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, December 1, 2000), 1, <https://papers.ssrn.com/abstract=254018>.

³⁴ Friedman, 1.

³⁵ Friedman, 1.

³⁶ European Central Bank, "Introduction," November 10, 2021, <https://www.ecb.europa.eu/mopo/intro/html/index.en.html>.

coins people swapped goods. Goods used were cattle or agricultural products but also shells, snails, or fur.³⁷ Eventually commodity money was replaced by coins. Coins solved the coincidence of wants problem which occurred in barter economies.³⁸ Coinage probably began between the 6th to 4th century in the Mediterranean, China, and the middle east.³⁹ Gold, Silver and copper were used for the coins. The value of the coins stemmed from the fact that precious metals were used. In Europe the invention of coinage is mythically linked to king Croesus of Lydia.⁴⁰ The use of minted coins developed in the Greek and Roman empires.⁴¹ It was probably during this time that the right of coinage and the concept of state sovereignty became so deeply intertwined.⁴² Initially governments were tasked with certification of weight and purity. If the metal carried the stamp of an appropriate authority, it was considered money. But it was considered money because it had the necessary weight and purity. It is important to note that value stemmed from weight and purity rather than from the authority giving it its value.⁴³ This changed in the Middle Ages when the perception arose that money gets its value from an act of government rather than the value of the metal.⁴⁴ One event which is crucial to the history of money is the return of Marco Polo from China. Along with goods he brought the concept of paper money to Europe which had been previously developed in China during the Kublai Khan dynasty.⁴⁵ After the concept had been introduced governments issued paper money which

³⁷ François R. Velde and Warren E. Weber, "Commodity Money," in *Monetary Economics*, ed. Steven N. Durlauf and Lawrence E. Blume (London: Palgrave Macmillan UK, 2010), 27–33, https://doi.org/10.1057/9780230280854_4.

³⁸ Nigar Hashimzade, Gareth Myles, and John Black, "Coincidence of Wants," in *A Dictionary of Economics* (Oxford University Press, 2017), <http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-444>.

³⁹ Velde and Weber, "Commodity Money."

⁴⁰ Velde and Weber; Hayek, *Denationalisation of Money*, 28.

⁴¹ Velde and Weber, "Commodity Money"; Hayek, *Denationalisation of Money*, 28.

⁴² Hayek, *Denationalisation of Money*, 29.

⁴³ Hayek, 30.

⁴⁴ Hayek, 30.

⁴⁵ Alfred Kennedy, "Marco Polo on Money | Alfred Kennedy," December 1, 1977, <https://fee.org/articles/marco-polo-on-money/>; "Marco Polo Describes the Issue of Paper Money in the Mongol Empire : History of Information," accessed April 4, 2022, <https://www.historyofinformation.com/detail.php?entryid=287>.

was convertible into gold or silver.⁴⁶ This became known as the gold standard where paper money was convertible into gold. The gold standard was eventually abolished in the 1930s.⁴⁷ With the abolishment of the gold standard, we arrived at the money we use today which is known as fiat money. Recent events might change the direction money and currency are going. In the past that money was essentially controlled by states this is prone to change as more and more actors are entering the playing field.

b) Seigniorage

Seigniorage is the profit generated by producing money.⁴⁸ Today most central banks have the sole right to produce bills and coins. The cost to produce these items is far lower than the nominal value they carry. The central banks hand the newly produced money out to private banks. The private banks pay the nominal value to the central bank. The difference between the cost to manufacture a coin or a bill and the nominal value. It is today a source of revenue for the central bank and thus effectively the state.⁴⁹ This was not always the case. In the beginning the governments only charged a seigniorage adequate to cover the cost of minting. But governments quickly realized that this is a valuable source of revenue. They increased the seigniorage beyond the cost of manufacturing only to maximize their profit.⁵⁰

c) Legal tender

The concept of legal tender is essential to understand Hayek's critique of our current monetary system. I will focus in my analysis on a European perspective. In general, legal tender means a form of money that a creditor is obliged to accept.⁵¹ What types of money are creditors obliged to accept? I

⁴⁶ Hayek, *Denationalisation of Money*, 31.

⁴⁷ History.com Editors, "FDR Takes United States off Gold Standard," HISTORY, accessed May 5, 2022, <https://www.history.com/this-day-in-history/fdr-takes-united-states-off-gold-standard>.

⁴⁸ Nigar Hashimzade, Gareth Myles, and John Black, "Seigniorage," in *A Dictionary of Economics* (Oxford University Press, 2017), <http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-2798>.

⁴⁹ European Central Bank, "Was ist Seigniorage?," European Central Bank, November 18, 2021, <https://www.ecb.europa.eu/ecb/educational/explainers/tell-me/html/seigniorage.de.html>.

⁵⁰ Hayek, *Denationalisation of Money*, 30.

⁵¹ Nigar Hashimzade, Gareth Myles, and John Black, "Legal Tender," in *A Dictionary of Economics* (Oxford University Press, 2017),

will look at the European understanding of legal tender. In the EU the Euro notes are the only legal tender according to Article 128 (1) Sentence 3 TFEU. Article 128 TFEU states explicitly that Euro notes are legal tender.⁵² The TFEU does not say which elements define legal tender. If one looks at the Recommendation 2010/191/EU⁵³ key aspects of legal tender can be found. This recommendation proposes that legal tender means mandatory acceptance of the note/coin deemed legal tender, acceptance at full face value of the corresponding note/coin and the power to discharge from payment obligations with the note/coin.⁵⁴ The recommendation acknowledges that parties can agree on something different to circumvent the mandatory acceptance requirement. But this does not stunt the fact that the debtor can free himself from his payment obligations if he tenders the creditor his debt in euro notes or coins.⁵⁵ What must be noted is that in the EU only Euro notes and coins are legal tender. This does not mean that payments such as Giro transfer, direct debit or within a credit card framework are illegal. In these payments the money is transferred only digitally, and it is not legal tender.

d) Inflation and deflation

i) Inflation

Inflation is a broad increase in prices for goods and services. It means that the money today buys less than it would have yesterday. The broad increase in prices causes the value of a currency to be reduced over time.⁵⁶

<http://www.oxfordreference.com/view/10.1093/acref/9780198759430.001.0001/acref-9780198759430-e-1783>.

⁵² "Consolidated Version of the Treaty on the Functioning of the European Union#PART THREE - UNION POLICIES AND INTERNAL ACTIONS#TITLE VIII - ECONOMIC AND MONETARY POLICY#CHAPTER 2 - MONETARY POLICY#Article 128 (Ex Article 106 TEC)," 202 OJ C § (2016), http://data.europa.eu/eli/treaty/tfeu_2016/art_128/oj/eng.

⁵³ "Commission Recommendation of 22 March 2010 on the Scope and Effects of Legal Tender of Euro Banknotes and Coins," OJ L, vol. 083, March 22, 2010, <http://data.europa.eu/eli/reco/2010/191/oj/eng>.

⁵⁴ "Commission Recommendation of 22 March 2010 on the Scope and Effects of Legal Tender of Euro Banknotes and Coins."

⁵⁵ "Commission Recommendation of 22 March 2010 on the Scope and Effects of Legal Tender of Euro Banknotes and Coins."

⁵⁶ European Central Bank, "What Is Inflation?," European Central Bank, September 7, 2021, <https://www.ecb.europa.eu/ecb/educational/hicp/html/index.en.html>.

ii) **Deflation**

Deflation is exactly the opposite from inflation. In a deflation consumer prices for goods and services decrease while purchasing power increases. This means that the money of today will buy more tomorrow. This causes people to halt their spending and wait for prices to drop further.⁵⁷

e) **Distributed Ledger Technology, Blockchain, proof of stake and proof of work, forks, DAO**

When Hayek wrote his book, he probably did not envisage the advent of the internet and the advances made in cryptographic technology. If we want to apply his ideas to today's world it seems likely that the realization of his ideas would be based on cryptographic technology. This means they would essentially rest on a blockchain. What is a blockchain, what does distributed ledger mean and what are cryptocurrencies.

i) **Distributed Ledger technology (DLT)**

DLT and blockchain are often used interchangeably. But they are not the same. A DLT is a way of storing and validating data. The DLT is in rudimentary terms a decentral database which allows its users to read its contents and add new entries. Contrary to centralized systems no central authority is needed to validate an entry. The data is spread across several sites, institutions, or countries. It is synchronized and replicated among these sites. The key feature of a DLT is that there is no central administrator, but it works on a consensus base. How this consensus and validation is achieved depends on the technology used. This means that all blockchains are DLTs but not all DLTs are blockchains as there are other technical ways than the ones used in the blockchain.⁵⁸

ii) **Blockchain**

The blockchain in theory makes a trusted intermediary obsolete. With blockchain technology no intermediary is necessary to validate a transaction. Currently when bank transfers or other transactions are made usually an

⁵⁷ Kate Ashford, "What Is Deflation?," Forbes Advisor, August 25, 2021, <https://www.forbes.com/advisor/investing/what-is-deflation/>.

⁵⁸ Niaz Chowdhury, *Inside Blockchain, Bitcoin, and Cryptocurrencies* (New York: Auerbach Publications, 2019), <https://doi.org/10.1201/9780429325533>.

intermediary is necessary to validate that the transaction can be executed. This is necessary to solve the problem of double spending. Currently banks or other payment services (PayPal, Venmo, Alipay) guarantee that no double spending occurs. Our current system relies on a trusted intermediary.⁵⁹ The blockchain makes this trusted intermediary obsolete. A blockchain rests upon cryptographic algorithms and a peer-to-peer network.

A comprehensive definition can be found in “Inside Blockchain, Bitcoin, and Cryptocurrencies” here by Niaz Chowdhury defines blockchain as:

“A blockchain is an immutable distributed ledger secured by cryptographic techniques and managed by a decentralized community over a peer-to-peer network through incentivization.”⁶⁰

iii) Cryptocurrency

A cryptocurrency is a system in which tokens are issued. These tokens are meant to be used as medium of exchange, store of value or to keep track of decision-making rights. The key feature of such currency is that they are based on a decentralized cryptographic approach which establishes trust rather than a central institution.⁶¹

iv) Proof of work (POW)

The essential problem to a blockchain is how can data be validated and then stored without a third-party intermediary. The solution comes with proof of work and proof of stake algorithms. Proof of work is the “traditional” approach. The Bitcoin blockchain and many others rest upon a proof of work algorithm.⁶² The Proof of work mechanism incentivizes so called “miners” to provide computer hardware. This computing power is used to process transactions into blocks. Each block contains several transactions, a time stamp, and a hash⁶³. These hashes serve to encrypt each block. The next block contains the previous hash and can only be added if the hash of the

⁵⁹ Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System,” 1.

⁶⁰ Chowdhury, *Inside Blockchain, Bitcoin, and Cryptocurrencies*, 8.

⁶¹ Ingolf G. A. Pernice and Brett Scott, “Cryptocurrency,” *Internet Policy Review* 10, no. 2 (May 20, 2021): 2, <https://doi.org/10.14763/2021.2.1561>.

⁶² Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System,” 1.

⁶³ Bitpanda, “Was ist eine Hash-Funktion in einer Blockchain-Transaktion?,” accessed April 13, 2022, <https://www.bitpanda.com/academy/de/lektionen/was-ist-eine-hash-funktion-in-einer-blockchain-transaktion>.

next block matches a part of the previous blocks hash. Figuring this out requires computational work. As the chain gets longer more computational power is needed to add the next block. If an attacker were to insert a fraudulent block, he would need to create a longer chain of blocks as only the longest one is accepted by the network. This means he would need more computational power than the rest of the network.

The security of the chain is guaranteed as the underlying algorithm of the system only recognizes the longest chain as the right one. This one is also the one with the most work put in. That's where the name proof of work stems from. Another characteristic of proof of work based blockchains is how the community arrives at decisions concerning the blockchain. With proof of work algorithms usually each CPU gets one vote. Not only to validate a transaction but also concerning a blockchains future. Thus, the longest chain encompassed the greatest CPU power.

v) Proof of stake (POS)

Crucial for a blockchain and thus a cryptocurrency is the mechanism with which consensus is achieved and data is stored. Another mechanism that is used beside proof of work is known as Proof of stake (POS). A blockchain is essentially a chain of stored transactions. Transactions are stored in blocks. Proof of stakes comes into play when the question arises when one moves from one to the next block. In a POS environment a predetermined algorithm choses a group of individuals that validate the transactions in one block. The algorithm takes the number of tokens the individuals hold into consideration. They are the collateral an individual provides. The individuals who validate the transaction are then rewarded with a transaction fee. Thus, the algorithm itself provides and incentive to participate in the blockchain the tokens an individual holds which are used as stake protect against malicious activity. The tokens can be lost if a block is detected to be fraudulent.⁶⁴

⁶⁴ "Proof of Stake vs. Delegated Proof of Stake," Gemini, accessed April 12, 2022, <https://www.gemini.com/cryptopedia/proof-of-stake-delegated-pos-dpos>, <https://www.gemini.com/cryptopedia/proof-of-stake-delegated-pos-dpos>; "How to Stake Crypto: Proof of Stake in Blockchain," Gemini, accessed April 12, 2022, <https://www.gemini.com/cryptopedia/staking-rewards-pos-blockchains>, <https://www.gemini.com/cryptopedia/staking-rewards-pos-blockchains>.

vi) Decentralized Autonomous Organization

A decentralized autonomous organization (DAO) is an organization that is governed by code rather than people. It runs on smart contracts which are encoded as computer programs. The governance is executed through algorithms. The code can only be modified if consensus among the users is achieved.⁶⁵ DAOs often serve as an alternative to classic organizations. The code running the DAO can be altered by the community. A DAO is usually a collectively owned and managed institution in which decisions are made by proposals and voting.⁶⁶ Whether to act or not is then decided by the underlying algorithms rather than people.

vii) Fork

A fork describes an event in which the community of a blockchain cannot agree on the future of the corresponding chain. In the incidence of a fork the previously single chain splits into two chains. Each with their individual policy and independent of each other. The most famous case of a blockchain fork is the one of the original Bitcoin chains splitting up into Bitcoin and Bitcoin cash.⁶⁷

f) Gatekeeper

I want to address legal remedies in which denationalized currencies could function. To do this it is necessary to understand the concept of gatekeepers. A gatekeeper is an institution or a person that controls access to a resource they do not own.⁶⁸ The gatekeeper profits of customers who want access to a certain resource.⁶⁹ In case of big tech companies, the resources are information and/or access to its users.

To better understand what the gatekeeper phenomenon means I will give an example. A business such as a carpenter relies heavily on the fact that customers find its contact details. If this isn't the case the carpenter will go

⁶⁵ Usman W. Chohan, "The Decentralized Autonomous Organization and Governance Issues," *SSRN Electronic Journal*, 2017, 5, <https://doi.org/10.2139/ssrn.3082055>.

⁶⁶ "Decentralized Autonomous Organizations (DAOs)," ethereum.org, accessed May 2, 2022, <https://ethereum.org>.

⁶⁷ Bitpanda, "Wie funktionieren Hard Forks und Soft Forks?," accessed April 13, 2022, <https://www.bitpanda.com/academy/de/lektionen/wie-funktionieren-hard-forks-und-soft-forks>.

⁶⁸ Mamadi Corra and David Willer, "The Gatekeeper," *Sociological Theory* 20, no. 2 (2002): 180.

⁶⁹ Corra and Willer, 180.

out of business. Today google is primarily used to find such information. For the carpenter's business it is necessary that he will be listed on Google's search results. Now Google is the gatekeeper who controls access to the contact details while they do not own them. Another example would be an app developer. This app developer is dependent that his app is accessible via the app store. Google/apple did not make the specific app, but they control the app stores. These are necessary to distribute it. The EU eventually acknowledged this problem and is now pushing for the digital markets act. With the DMA the EU sets certain criteria for a service to qualify as a gatekeeper.⁷⁰

5) Problems with our monetary system according to Hayek

Hayek is deeply concerned about governments holding the exclusive control over currency. He calls the control over money a "persistent abuse of the governments prerogative"⁷¹. Hayek acknowledges that this prerogative was over time so firmly established that only few scholars including himself questioned it. The result of the abuse is inflation.⁷² Governments have throughout history abused their power to engineer inflation to their own benefits. He is deeply skeptical about scholars who argue that periods of economic progress were only enabled by inflation.⁷³ Hayek refuses to accept the argument that the economic decline during the Middle Ages was caused by deflation. He blames the economic deterioration on the overall situation in the Middle Ages. Rather than deflation causing a recession the economic decline was caused by wars and migration that had destroyed markets. In response to this people did not spend but saved money contributing only to the downturn.⁷⁴ According to Hayek this is proven by the fact that in northern Italy where economies bounced back early the local princes quickly started diminishing the value of their currencies again.⁷⁵ The "defrauding of people" by the government was bolstered by

⁷⁰ "Das Gesetz über digitale Märkte: für faire und offene digitale Märkte," Text, EU-Kommission - European Commission, accessed January 20, 2022, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_de.

⁷¹ Hayek, *Denationalisation of Money*, 33.

⁷² Hayek, 33.

⁷³ Hayek, 34.

⁷⁴ Hayek, 34.

⁷⁵ Hayek, 34.

the introduction of paper money.⁷⁶ The Problem with paper money was that people were hesitant to accept it as means of transaction. Thus, Governments were forced to introduce laws making people accept it. To do so Hayek argues that governments had to introduce severe punishment in some cases even death.⁷⁷

Early on people had little option than accepting the government money as they were threatened with severe punishment. This led to the emergence of two misunderstandings as Hayek calls them.⁷⁸ The first is the necessity of legal tender. As outlined above legal tender is a type of money that a creditor cannot refuse in discharge of a debt. Hayek states that there is no requirement that money must be issued by a government.⁷⁹ Hayek argues if governments have the power to issue and decide on the use of money, they also have the power to decide in which ways debts can be discharged.⁸⁰ He does not see a necessity why this must be government currency or why all types of legal tender should be money.⁸¹ He continues in his argument regarding the misunderstandings about legal tender. People live with the false believe that the state creates money with value.⁸² As outlined the opposite is true for Hayek. States have throughout history abused their power to devalue money to their own benefits.⁸³ Money is not invented by the state, and it can exist independently of the state. Another argument Hayek puts forward is that legal tender laws force people to accept something they have never agreed upon. He backs this argument up with relating to cases fought after the American civil war. These cases came to be known as the legal tender cases. Substance of these cases was if creditors must accept payment in dollars after the value of the dollar had dropped significantly.⁸⁴ Similar cases came to court in Germany after the first world war. The courts then ruled that “Mark is Mark”. Hayek argues that these creditors did not agree on payment in a devalued currency. The obligation to do so creates uncertainty for market participants. Hayek concludes his argument against legal

⁷⁶ Hayek, 34.

⁷⁷ Hayek, 34.

⁷⁸ Hayek, 36.

⁷⁹ Hayek, 36.

⁸⁰ Hayek, 37.

⁸¹ Hayek, 37.

⁸² Hayek, 37.

⁸³ Hayek, 37.

⁸⁴ Hayek, 40.

tender with arguing that the belief legal tender is necessary for taxes and contracts is completely wrong. Hayek states that a government should be free to decide in which currency its taxes have to be paid or which currency it chooses for its contracts. At the same time courts could be free to choose in which currency damages should be paid. Hayek claims that there is no need for special legislation deciding the currency in which a payment needs to be made.⁸⁵

Gresham's law is a theory that states that bad money will drive good money out of the market.⁸⁶ In practical terms this "law" shows effects for areas where two or more types of money are used. One of the moneys is undervalued and the other overvalued. Between these two moneys a fixed exchange rate is set meaning one is substitutable for the other. The problem then is that people will only use the money with a lower value for everyday transactions and find a more profitable use for the money with a higher value.⁸⁷ This use could be using it to store value or collecting it to make profitable use of the materials the money is made of. It applies when the exchange rates between currencies have been fixed. If the exchange rate would be variable, then people would get rid of the bad money in favor of the "good" money. Eventually only the money would be used that is regarded as the best.⁸⁸ According to Hayek neither legal tender laws are necessary nor does Gresham's law pose a problem. The government prerogative is founded on these two misapprehensions. To him legal tender is an overdue concept and Gresham's law would not pose a problem if the exchange rate would remain variable.

6) Solutions put forward by Hayek

To overcome government created inflation he proposes the privatization of currency. Hayek wrote his book in the 70ies, so his proposals are rather analog. One can be certain that today a comparable project would be digital. Before describing how such a digital denationalization could look like it is helpful to see what Hayek proposed when he wrote his book.

Hayek proposed that states give up their monopoly on money in favor of a currency

⁸⁵ Hayek, 40–41.

⁸⁶ "Gresham's Law | Economics | Britannica," accessed April 11, 2022, <https://www.britannica.com/topic/Greshams-law>.

⁸⁷ "Gresham's Law | Economics | Britannica."

⁸⁸ Hayek, *Denationalisation of Money*, 43.

competition. Meaning they allow every institution or individual be this private or public to issue their own “money”. People were then free to choose from an array of currencies.

He proposes that institutions called banks issue a paper with a trademarked name. This paper would be non-interest bearing and people could open cheque accounts with the issuing institution. These accounts were denominated in the newly created unit. The issuing institutions would be obliged to redeem the certificates with francs or D-Mark.⁸⁹ So far, the only difference is that the issuing institution is a private one and not a state controlled one. But the key feature would be that the issuing institutions would announce and consequently try to keep their currencies purchasing power stable. The institutions would also continue to announce and adapt the commodity value of the currency. It would be made available due loans or sold for other currency.⁹⁰

The value of the newly formed currency would not be fixed. The issuer would try to keep it constant, but its value would be determined by competition. If we allow one institution to issue money, then we would allow all institutions to do so. This would in theory lead to several different currencies issued by different institutions. The different institutions would be interested in people using theirs instead of someone else's. To achieve this, they would all be working towards their promises of offering a stable currency. If the issuer fails to fulfill its obligation, then the public would quickly abolish his currency in favor of another and he would lose his business.⁹¹

The product would be a currency that is in high demand as people expect it to preserve its purchasing power. This only works if it is guaranteed that there were no limits on the usage of it introduced. The expected value is a key determinant for people wishing to hold or sell the currency.⁹² The constant demand for the money would motivate the institution to keep the value of the currency constant. Private institutions are supposedly better at it than states. A private currency issuer can lose its customer and run out of business while a state issuing currency is not at that danger. The institution would keep its currency stable either by increasing or

⁸⁹ Hayek, 46.

⁹⁰ Hayek, 46–47.

⁹¹ Hayek, 51.

⁹² Hayek, 59.

decreasing the quantity of issued money.⁹³ This would happen through selling or buying a currency or by contracting/expanding its lending activities.⁹⁴

With the market operations the institution would aim to keep the value stable.

Hayek proposed raw materials as commodity basket against which the purchasing power of each currency should be measured.⁹⁵ While commodity prices are easier to measure, I would argue that a basket like the ones used to create the

“Verbraucherpreisindex”⁹⁶ is more reasonable. For everyday life the goods included in this basket are more important. Additionally, this basket would also include the most common services utilized. Such a basket would serve as a benchmark for the currency. The institutions would strive to keep its currency stable. Meaning the purchasing power of the currency were to remain the same. This is made possible as real time information would be used to adapt the amount of currency circulating.

Hayek states that goods and services would then be priced in different currencies.

This seems inconvenient as I will argue later, I believe that we will see centralization with private currencies as well. In the beginning there might be different currencies to consider but eventually we will see a “dominating” currency emerge.

In Hayek’s proposal the press would bear an essential responsibility. They would be tasked with publishing daily deviations of different currencies so people could decide which one they would use today.⁹⁷ Greed would produce a stable currency and force the institution to keep its promises because otherwise people would rush to another one.⁹⁸

7) Two scenarios

To analyze risks and chances of a complete denationalization I am going to describe two scenarios. They differ from each other by the functioning of the underlying currency used. Both scenarios rest upon the semi fictitious idea that crypto currencies are used in everyday life. Consumers use them to pay. Businesses conduct their operations in crypto currencies. Both scenarios will take place in a market where

⁹³ Hayek, 52.

⁹⁴ Hayek, 59.

⁹⁵ Hayek, 61.

⁹⁶ “Warenkorb Und Gewichtung,” accessed April 11, 2022, https://www.statistik.at/web_de/statistiken/wirtschaft/preise/verbraucherpreisindex_vpi_hvpi/warenkorb_und_gewichtung/index.html.

⁹⁷ Hayek, *Denationalisation of Money*, 54.

⁹⁸ Hayek, 51.

there is competition between several currencies. States only interfere in the currency market as they layout rules to govern the market and ensure fair competition. States are also free to offer their own currency for individuals to use. They do not hold a monopoly on currency any longer. The scenarios differ as one currency will be governed by a community. This currency takes an open-source, open access approach. The other will be issued by a company and will take a rather centralized approach when it comes to governance.

In both scenarios the currency will be competing with other currencies. There is currency competition like Hayek described. Scenario a) will take ideas from a currency like Bitcoin. Scenario b) will be based on a coin issued by a company similar Ripple or Diem/Libra (now put on ice). I chose these two types of currencies because they differ in the way they work. When Bitcoin was released in 2008 this was a revolution. Ideas around a currency based on cryptographic technology existed before but they were never realized. Only with the whitepaper published under the alias Satoshi Nakamoto those ideas became reality.⁹⁹ Since then many blockchains have become public. They differ widely regarding functions, speed, stability, and features. For my scenarios I will first establish commonalities and then outline differences.

a) Common features of the 2 scenarios

i) Hayek's propositions

For my scenarios I am going to assume that several of Hayek's propositions will work. I am going to assume this because I do not want to analyze Hayek's arguments themselves but how crypto currencies fit into his proposal. I am going to assume that competition of currency caused inflation to stop. Increasing the monetary supply would only cause the issued currency to devalue. Thus, issuers refrain from deliberately altering money supply. I am going to assume that with competition in currency the concept of beneficial inflation will be overcome.¹⁰⁰ Hayek rejects the concept of beneficial inflation and argues in favor of competing currencies to overcome the addiction to cheap money.¹⁰¹ He argues that if his propositions are implemented no more

⁹⁹ Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System."

¹⁰⁰ Hayek, *Denationalisation of Money*, 96–97.

¹⁰¹ Hayek, 97.

monetary policy is possible.¹⁰² But he goes further explicitly that monetary policy is not necessary anymore. This is the case because if we subject money to market processes it would regulate itself.¹⁰³ If money is excluded from market mechanisms it causes misdirection's and financial bubbles.¹⁰⁴ Hayek states that with competition in currency a more democratic society would be achieved. With no more monetary control governments could not implement monetary policy that benefit groups. If they lose the ability to favor one group over the other this would contribute to democracy and governance.¹⁰⁵ I am going to consider and assess this argument in both scenarios. I will focus on democratic processes if currencies are controlled by institutions who have deliberate power over them. Hayek argues that a denationalization of currency would protect democratic states from becoming totalitarian. To Hayek governments tend to accelerate their claim over the national income. He argues that soon governments will claim 100% of national income.¹⁰⁶ This can be prevented most efficiently if currency is denationalized.¹⁰⁷ I will analyze this claim and consider the situation where private institutions amass power rather than governments.

ii) Future of Blockchain

To set the stage for the two scenarios it is important to imagine a world where most transactions are conducted digitally. Not in a way as they are today via bank transfers but via digital currencies. These currencies exist only in digital form. To do so I will outline what the blockchain of the future will rudimentarily look like. Today blockchain based cryptocurrencies suffer from a variety of problems. Even with big names like Ethereum or Bitcoin their transaction throughput diminishes in comparison to large payment services like Visa or MasterCard.¹⁰⁸ Today improvements have been made but

¹⁰² Hayek, 100.

¹⁰³ Hayek, 102.

¹⁰⁴ Hayek, 102.

¹⁰⁵ Hayek, 102–3.

¹⁰⁶ Hayek, 120.

¹⁰⁷ Hayek, 120–21.

¹⁰⁸ “No, Visa Doesn’t Handle 24,000 TPS and Neither Does Your Pet Blockchain – Blockchain Bitcoin News,” *Bitcoin News* (blog), April 20, 2018, <https://news.bitcoin.com/no-visa-doesnt-handle-24000-tps-and-neither-does-your-pet-blockchain/>.

blockchains are still slow in processing transactions especially when it comes to smaller amounts.¹⁰⁹ Transferring smaller sums via blockchain today can be inefficient as transactions cost can be high. There are already solutions to this such as the polygon protocol.¹¹⁰ In the future this is likely to change. Transaction speed will go up and transaction fees are likely to go down. Especially with creation of a currency targeted at small transactions. For my scenarios I will assume that technical advancement in hard and software will make transactions faster, more secure, and cheaper.¹¹¹ Security concerns will continue to exist, so will transaction fees. But I will consider these neglectable especially when compared with the issues of current financial transactions.

iii) Wallets

Imagine a world where there is mostly digital money circulating. Not in the form of bank accounts or PayPal/Venmo/Alipay payments but as currencies that only exists digitally. It might exist on phones, computers, tablets, and some type of digital storage devices. On these electric devices so called wallets are installed. These wallets hold, just like real life wallets, several forms of digital currency. Such wallets exist already, there are online and offline wallets where digital assets can be stored. As there will be several currencies circulating a multi-currency wallet is needed. Such applications exist already and can store a multitude of currencies.¹¹²

Like cash today where money just changes hands no intermediary would be needed. This will require that the wallets an individual uses are able to send and receive money. This is already the case with most wallets. Today most saving accounts charge a fee for holding money. This seems illogical that one must pay an institution to hold its money when this institution uses the same money to conduct its business with it. With crypto wallets and the corresponding applications one can determine himself what happens to his

¹⁰⁹ "What Would A Full Crypto World Look Like?," Ledger, April 13, 2021, <https://www.ledger.com/blog/what-would-a-full-crypto-world-look-like>.

¹¹⁰ "What Is Polygon? | Polygon Technology | Documentation," accessed April 18, 2022, <https://docs.polygon.technology/docs/home/polygon-basics/what-is-polygon>.

¹¹¹ "What Would A Full Crypto World Look Like?"

¹¹² "Top 8 Multi-Currency Crypto Wallets," *CryptoPotato* (blog), March 26, 2018, <https://cryptopotato.com/top-6-multi-currency-digital-wallets/>.

money. For my scenarios I will assume that there are easy to use, secure multi-currency wallets. These wallets give each user control over their finance, let them connect with financial markets and are free.

Some wallets today already offer an interface where one currency can be exchanged for another at the corresponding trading price. For my scenarios this will be a standard feature of each wallet. Wallets can connect to a currency exchange where individuals or businesses buy and sell currencies thus enabling the exchange of currencies. It is unlikely but this might be necessary as not everyone will accept every currency. To overcome this, wallets will offer the possibility to easily swap currencies.

iv) Everyday usage

Today money in crypto wallets mainly serves as a store of value or for speculative reasons. At some places there are ATMs where fiat cash (Euros, US-Dollars, etc.) can be withdrawn. Some places enable the customer to pay with cryptocurrencies. Today these include companies such as Microsoft, Twitch and Wikipedia but also companies like AT&T and AMC.¹¹³ In fig.4 we can see what people use cryptocurrencies for and who are the main actors in these exchanges.

¹¹³ "Who Accepts Bitcoins in 2022? List of 20+ Major Companies," 99 Bitcoins, accessed April 13, 2022, <https://99bitcoins.com/bitcoin/who-accepts/>.

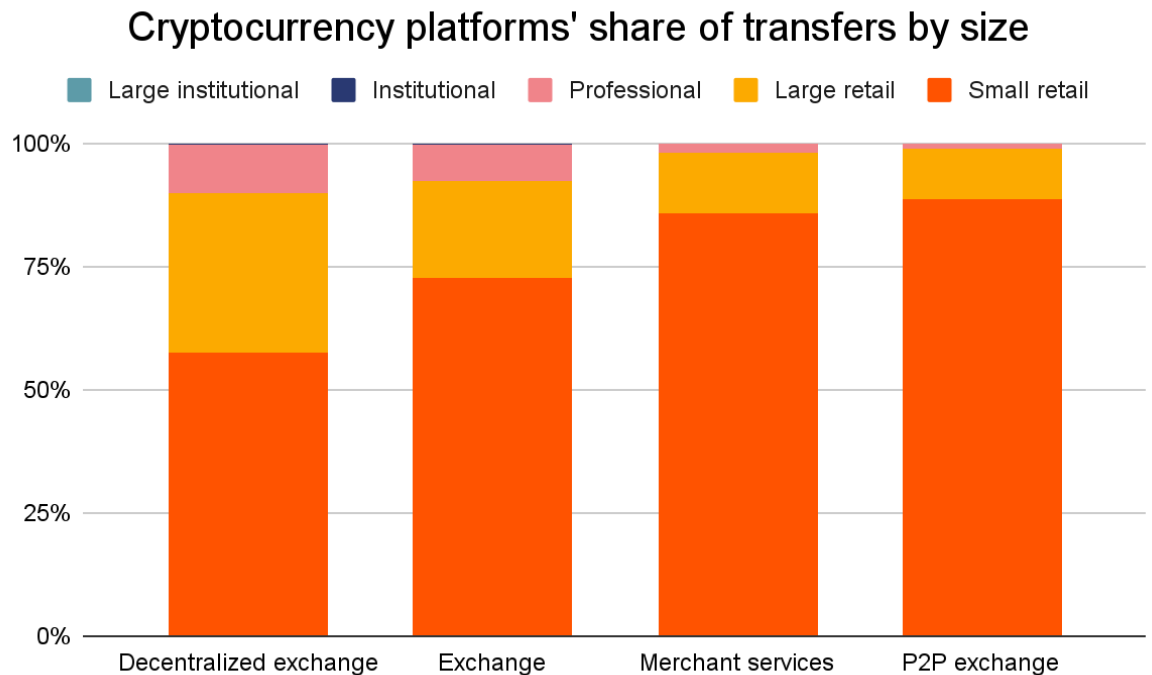


Fig.4 Depicting what crypto currencies are used for and who the actors are¹¹⁴

For my scenario I will assume that the individual can pay almost everywhere with digital currencies. Whether this will be grocery shops, restaurants, commodity stores or for services. It also means that an individuals can easily transfer money from one to another wallet. I assume that transaction fees have been reduced. Alternatively, there are currencies addressing especially the transferal of small sums. These currencies are programmed in a way that there are little to no transaction costs. Essentially crypto currencies have been widely adopted in usage. They are part of everyday life, and everyone uses a variety of currencies.

v) Security concerns

The payment environment of the future needs to combine user friendliness with security. Some might say this will never be possible as people would fear for their money, or such apps are vulnerable to hacking. Another concern stated is what happens if the phone is lost or stolen. Then the wallet with its assets would be gone. In my opinion these concerns are unfounded. Today many people use their phones to pay already. This is enabled by apps such as

¹¹⁴ "The 2021 Global Crypto Adoption Index."

Apple Pay or Google Pay or in China and other southeast Asian countries Alipay. People store their card and account details in apps. These apps are then used to pay for goods and services. These payments can either be executed with the help of NFC technology or there are bank transfers done via online banking apps. In case a phone gets stolen the same security concerns apply already as they would with a crypto wallet.

If one argues against the use of wallets because the danger of hacking the blockchain they probably do not know how blockchain technology works. The wallet app on the phone itself can be hacked as it will probably be only protected by a password, fingerprint or Face ID. Password security must be guaranteed. However, this can be easily done by requiring certain conditions for a password. The same risks apply to the payment apps used today already as they are also only protected by apples Face ID or a code.

But what if the blockchain itself gets hacked? In theory a hack is possible, but an actual hack is extremely unlikely if not impossible.¹¹⁵ The cryptographic algorithms a blockchain rests upon make a blockchain nearly impossible to hack.¹¹⁶ In theory it is possible but practically for POW and POS based blockchains this is extremely hard and almost impossible. Enormous computer power would be required.

“But there have been hacks in the past” some might say. A differentiated approach is necessary to understand the risks. There are different types of hacks that can take place. Some concern individual wallets, some currency exchanges and in extreme cases even a blockchain could be hacked. The ones which were successful in the past concerned only currency exchanges rather than blockchains themselves.¹¹⁷ If an exchange gets hacked this poses an enormous risk for customers storing currency with such exchange. It is obligatory to take all means to provide a secure and stable exchange platform. Even if all measures are taken this cannot guarantee absolute security. There are several measures everyone can take to secure their

¹¹⁵ Bitpanda, “Kann Bitcoin gehackt und stillgelegt werden?,” accessed April 13, 2022, <https://www.bitpanda.com/academy/de/lektionen/kann-eine-kryptowahrung-wie-bitcoin-gehackt-oder-stillgelegt-werden>.

¹¹⁶ Bitpanda.

¹¹⁷ Bitpanda.

currency such as password security and two factor authentication. Alongside an individual approach exchange providers must invest significantly in a security infrastructure. If they are hesitant to do so they should be forced by law. But I would like to emphasize that our current banking system is also flawed. Extensive speculation in the past has led to bubbles and cause huge losses to individuals for example with the crash of the German Commerzbank.¹¹⁸

Today people seem to trust the big tech companies with almost all their data including banking details. This appears to me as very irrational. It might be comfortable to use their services, the everyday user seems to have forgotten about the associated risks. Big tech companies such as Facebook and Apple have been victims to hacking attacks in the past.¹¹⁹ People seem to forget that data stored with those companies can be stolen and then abused especially since it is centrally stored. Companies themselves will use this data to profit of it. This happens through advertising or selling the data to lucrative buyers such as governments, political parties, or security companies. Users have little control over what happens to their data.¹²⁰ This also concerns banking details. If such information is stored with tech companies one gives up control over how it is used, stored, and secured. It might not be the best idea to store such vulnerable data with a tech company. In comparison to data being stored with third parties having a crypto wallet where data is stored on an immutable, decentral, encrypted blockchain appears to be a manageable risk.

vi) Taxation, seigniorage and settlement

What happens to taxation and court settlements if everyone uses crypto currencies, and no one uses “traditional” currencies? A similar question was

¹¹⁸ “WirtschaftsWoche: Das führende Wirtschaftsmagazin | WiWo,” accessed June 3, 2022, <https://www.wiwo.de/>.

¹¹⁹ Aaron Holmes, “533 Million Facebook Users’ Phone Numbers and Personal Data Have Been Leaked Online,” Business Insider, accessed April 13, 2022, <https://www.businessinsider.com/stolen-data-of-533-million-facebook-users-leaked-online-2021-4>; “Apple entschied sich beim schlimmsten iPhone-Hack der Geschichte gegen direkte Warnung der Nutzer,” DER STANDARD, accessed April 13, 2022, <https://www.derstandard.at/story/2000126559190/apple-entschloss-sich-beim-schlimmsten-iphone-hack-der-geschichte-gegen>.

¹²⁰ “The Data Big Tech Companies Have On You,” *Security.Org* (blog), accessed April 18, 2022, <https://www.security.org/resources/data-tech-companies-have/>.

asked by Prof. Hayek. He did not consider this question regarding crypto currency but denationalized currency. Hayek acknowledges that governments must be able to decide in which currency its taxes have to be paid.¹²¹ In an environment where all transactions take place in a blockchain environment there is little reason why taxes should not be made in this environment as well.

Hayek came to a comparable conclusion in 1974. He stated that there is no reason why a government should not accept other units of account than its own currency.¹²² If there are currencies in use for everyday life and people use them to pay and earn money then a government can also set its taxes in the corresponding unit. It could do so by looking at the value of the different currencies and calculate the tax sum according to each value. These rates would automatically adapt if there were value fluctuations.

The same applies for damages to be paid in courts.¹²³ Courts today determine that one can fulfill its obligation by transferring other items than money. This might be a car, a property or any other item deemed valuable. All kinds of items have been used to fulfill debts. We see courts today not necessarily rely on national currency to fulfill claims. Determining the value of a good seems much harder than just agreeing on one of several currencies which would then be used to fulfill a debt. To ensure functioning of the legal system new rules might need to be put in places. These rules would then determine how and in which currency a debt can be fulfilled. For my scenarios I am going to assume that states accept taxes in a variety of currencies. They do not favor one over the other or subject one to disadvantages. Courts will be equipped with effective procedural rules that enable it to settle trials. Courts can rule that claims can be settled with a variety of currency.

If currencies aren't issued by central banks anymore this deprives the state of a source of revenue. With the right to issuing currency comes seigniorage. States profit of seigniorage and use it as source of revenue, Hayek already

¹²¹ Hayek, *Denationalisation of Money*, 40.

¹²² Hayek, 40.

¹²³ Hayek, 40.

described this and sees it as a reason for government malpractice.¹²⁴ Since the financial crises seigniorage income has been declining it still constitutes a source of revenue.¹²⁵ With the switch to competing crypto currencies the government will be deprived of seigniorage as source of revenue. Seigniorage would not cease to exist I would argue that the coins awarded for miners can be considered seigniorage. If a state wants to regulate mining, it could tax mining profits and thus incentivize certain types of mining. It could also profit from this new type of seigniorage.

vii) Energy efficiency

Besides security and usability issues blockchain based crypto currencies need to be energy efficient. Today critics argue that the use of crypto currencies is incongruously with climate protection. It is true that only the Bitcoin blockchain consumes per year the same amount of electricity as Austria or Norway does in a year, depending on the calculation.¹²⁶ The Bitcoin blockchain and the Ethereum blockchain are only the first generation of Proof of work blockchains. It is likely that with future blockchains being developed their efficiency is only going to increase. Today there are already solutions which increase efficiency and reduce energy consumption drastically. Examples are proof of stake algorithms¹²⁷, useful proof of work¹²⁸, side chain technology¹²⁹. For my scenarios I am going to assume that there are energy efficient solutions in place. The blockchains on which my scenario will be based use a variety of technology to reduce their energy consumption. This was achieved by progress made in software and hardware. These progresses were implemented after governments acknowledged the energy consumption of blockchains. They implemented proposals which favored

¹²⁴ Hayek, 30.

¹²⁵ Bank, "Was ist Seigniorage?"

¹²⁶ Rajit Nair et al., "An Approach to Minimize the Energy Consumption during Blockchain Transaction," *Materials Today: Proceedings*, November 24, 2020, 4, <https://doi.org/10.1016/j.matpr.2020.10.361>; Johannes Sedlmeir et al., "The Energy Consumption of Blockchain Technology: Beyond Myth," *Business & Information Systems Engineering* 62, no. 6 (December 2020): 603, <https://doi.org/10.1007/s12599-020-00656-x>.

¹²⁷ Nair et al., "An Approach to Minimize the Energy Consumption during Blockchain Transaction," 5.

¹²⁸ Sedlmeir et al., "The Energy Consumption of Blockchain Technology," 604.

¹²⁹ Nair et al., "An Approach to Minimize the Energy Consumption during Blockchain Transaction," 5.

energy efficient mining, taxed wasteful transactions or incentivized environmentally friendly investments.¹³⁰

viii) Know your customer rules

What about know your customer rules and privacy concerns? Aren't crypto currencies the preferred choice when it comes to buying illicit goods and services? No one can deny that crypto currencies are being used in all fields of criminal activity. Crypto currencies are used to launder money¹³¹, buy drugs or other illegal goods.¹³² Along with hacking attacks and encryption of data crypto currencies are being used to blackmail individuals.¹³³ Countries which are subject to international sanctions use crypto currencies to circumvent these sanctions.¹³⁴

These illegal activities must not be underestimated, and they need to be tackled. But people and news media tend to forget that in comparison to legal activity these illegal actions diminish. In 2021 the total crypto currency transaction volume reached its peak. The total transaction volume of crypto currencies reached 15.8 trillion US dollars.¹³⁵ According to the crypto crime report only 0.15% of the total transaction volume was linked to illicit transactions.¹³⁶ In 2021 criminals laundered 8.6 billion US dollars through cryptocurrencies.¹³⁷ This is 30% higher than in the previous year. But if we compare this number to the amount of money laundered with fiat currency, we realize that cryptocurrencies play a minimal role for money laundering. The UN office of Drugs and Crime estimates that every year between 800 billion and 2 trillion US dollars are laundered using fiat currency.¹³⁸ If crypto currencies continue to be more commonly adopted than abuse and illicit

¹³⁰ Jon Truby, "Decarbonizing Bitcoin: Law and Policy Choices for Reducing the Energy Consumption of Blockchain Technologies and Digital Currencies," *Energy Research & Social Science* 44 (October 1, 2018): 406–7, <https://doi.org/10.1016/j.erss.2018.06.009>.

¹³¹ "The Chainalysis 2022 Crypto Crime Report," 9 ff., accessed April 18, 2022, <https://go.chainalysis.com/2022-Crypto-Crime-Report.html>.

¹³² "The Chainalysis 2022 Crypto Crime Report," 99.

¹³³ "The Chainalysis 2022 Crypto Crime Report," 38 ff.

¹³⁴ "The Chainalysis 2022 Crypto Crime Report," 112 ff.

¹³⁵ "The Chainalysis 2022 Crypto Crime Report," 3.

¹³⁶ "The Chainalysis 2022 Crypto Crime Report," 4.

¹³⁷ "The Chainalysis 2022 Crypto Crime Report," 10.

¹³⁸ "Overview," United Nations : Office on Drugs and Crime, accessed April 18, 2022, <https://www.unodc.org/unodc/en/money-laundering/overview.html>.

activity will continue to take place within these currencies. I want to stress that the transparency offered by blockchain technology makes tracking illicit activity easier. Currently there are little to none know your customer rules in place. At the same time law enforcement agencies, NGOs and individuals continue to uncover scams, frauds, and illegal activity. I would like to emphasize that most illegal activity today takes place outside of the crypto currency realm. Blockchain technology is in principle very transparent. Transactions can be tracked and traced. The lack of KYC rules has not prevented law enforcement agencies as well as NGOs to crackdown on cyber criminals in the past.¹³⁹

For my scenarios I am going to assume that the crypto currencies being used offer a decent amount of privacy. Different currencies will take different approaches toward anonymity. Some will offer strong anonymity others will be more open about the transactions being stored on their blockchain. People will be using certain crypto currencies to receive money which should not be traced. This could be people who depend on the informal sector or people who are being persecuted by states or other individuals and thus need to remain anonymous. It could also be necessary to transfer money to activists, journalists or platforms that are considered opposition. In the past we have seen Wikileaks receive funding via Bitcoin or informants being paid in cryptocurrency because of the privacy it offers.¹⁴⁰ For such entities anonymity in money matters is essential.

Additionally, I am assuming that security agencies have acknowledged the potential of crypto currencies being used for illegal activity and thus expanded their investigative capabilities regarding blockchain. These capabilities can be used to tackle crime but also civil rights. It seems logical that governments will implement stricter KYC rules for crypto currencies.

¹³⁹ "The Chainalysis 2022 Crypto Crime Report."

¹⁴⁰ Roger Huang, "Hard-Hitting Investigative Journalism You Can Support With Cryptocurrencies," Forbes, accessed May 31, 2022, <https://www.forbes.com/sites/rogerhuang/2019/12/26/hard-hitting-investigative-journalism-you-can-support-with-cryptocurrencies/>; "Donate to WikiLeaks," accessed May 31, 2022, <https://shop.wikileaks.org/donate>; Roger Huang, "How Bitcoin And WikiLeaks Saved Each Other," Forbes, accessed May 31, 2022, <https://www.forbes.com/sites/rogerhuang/2019/04/26/how-bitcoin-and-wikileaks-saved-each-other/>.

b) Scenario a); a decentral approach

Now that we have established the commonalities, I am going to outline what the first scenario will look like. This currency will take an approach which is reminiscent of today's Bitcoin and Ethereum. Such currency could be based on a proof of work algorithm. This new algorithm would be highly efficient and capable of processing an immense number of transactions. One of its distinct features would be that its code would be open source. This is already the case with Bitcoin, Ethereum etc. The public can with relative ease run nodes and become a part of the decentral network. These features make it a permissionless blockchain. A permissionless blockchain allows everyone who desires to become part of the network of this new currency. Its distinctive features are a highly decentral network, full transparency, high resistance to censorship, no central governing authority and strong security as the ledgers would be stored on many devices and thus it is extremely complicate to corrupt 51% of the network. As with Bitcoin today policy changes would require consensus among the users who run the network. The permissionless blockchain would be one of the key arguments in favor of using this currency which competes with other currencies. The competition with other currencies creates pressure on the community running the currency in this scenario. They are forced to innovate and develop the underlying algorithm to be able to compete with other currencies. Implementation.

Contrary to Hayek's proposal no individual government body of an institution can decide on which policy to pursue. The algorithm decides on the most fitting monetary policy. Contracting or expanding monetary supply would be done to match current economic and external events. The algorithm could be designed to recognize change in external factors. This could be a change in population but also in the economic situation such as demand for business loans or national economic targets.¹⁴¹

Just as with the Bitcoin network people are incentivized to provide computational power.¹⁴² As they do so they earn small sums of the

¹⁴¹ "Flexibility in Sovereign Money System," *Positive Money* (blog), accessed June 1, 2022, <https://positivemoney.org/our-proposals/flexibility-in-sovereign-money-system/>.

¹⁴² Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," 4.

corresponding currency.¹⁴³ Thus, new currency is created. The amount how much currency is created would depend on the algorithm and the current economic situation which is factored in. In times when more money is needed more money is awarded through mining and vice versa. This currency could be programmed in a way that it needs to be spend in a certain amount of time.¹⁴⁴ This might motivate people to invest rather than hoard the freshly minted currency. In times where there is too much supply this feature could be disabled so people would be incentivized to save.

But who makes decisions regarding the algorithm? This concerns simple bug fixes but also improvements and adjustments. One possibility could be to run the currency in form of a DAO. This could be a benefit as the rules and procedures are enshrined in code and thus transparent. This might be an asset as it provides stability for the future as the rules by which the currency works are clear and immutable. The code contains governance and decision-making rules.

Participants know when and how votes will be taken. The problem with DAOs is that they can be inflexible. Changing the code can be a time-consuming process. This stems from the fact that the community must arrive at a decision whether they want to implement changes. This needs discussion and voting. This results in a complex process. A DAO may be inflexible and might leave it vulnerable. Bug fixes are harder to implement. Reacting to unforeseen crises might need voting within the DAO framework to adjust the code. Decision making can be a time-consuming process and impact the value of the currency. Its transparency and autonomy are its greatest strength but also greatest weakness.

A currency that enables everyone to participate would also be governed by everyone. This could be regarded as democratization of a currency. Whether this will be the case I am going to assess now. With running on a blockchain, transactions could be monitored. They would be anonymous it would still lead to greater transparency. If taxes were to be paid in this currency it would enable people to backtrack their taxes. One could see how the taxes paid were used or

¹⁴³ Nakamoto, 4.

¹⁴⁴ Yakko Majuri, "Overcoming Economic Stagnation in Low-Income Communities with Programmable Money," *The Journal of Risk Finance* 20, no. 5 (November 18, 2019): 602–3, <https://doi.org/10.1108/JRF-08-2019-0145>.

abused. This creates a chance to combat corruption and strengthen democratic institutions.

i) Chances

(1) No more inflation?

One of the biggest chances mentioned by Hayek is that with competition between currencies inflation would become a thing of the past. If there are several crypto currencies circulating in each area people had the possibility to choose which one to use. Functions might differ but there sure would be overlapping. Thus, we would see competition. But would this make inflation a thing of the past?

Hayek proposed that institutions regulate the amount of money depending on supply and demand. With this currency there would be two forces at play determining its value. One would be supply and demand the other would be the ability of the community to adapt the algorithm to economic events and innovate. The algorithm would try to stop people from hoarding the currency to tackle currency speculation. To prevent people from hoarding this currency and thus starting a deflationary cycle the mechanisms to incentivize people to spend needs to be strong.

Assuming with Hayek that the inflationary cycle is solely caused by governments then such a currency would help prevent inflation.¹⁴⁵

To explain the connection between money supply and inflation it helps to look at the quantity equation. This equation states that:

$$M \cdot V = P \cdot Q.$$

M is the quantity of money, V is the velocity of money, P is the price level and Q is the volume of transactions.¹⁴⁶ This theory links the quantity of money to the price level. When applying this theory, we see that a change on the money side influences the supply side. Increasing M or V can cause inflation if the good supply can't keep up due to restraints such as full employment or a pandemic. The quantity equation assumes that V is

¹⁴⁵ Hayek, *Denationalisation of Money*, 95 ff.

¹⁴⁶ Bundeszentrale für politische Bildung, "Quantitätstheorie," bpb.de, accessed May 31, 2022, <https://www.bpb.de/kurz-knapp/lexika/lexikon-der-wirtschaft/20428/quantitaetsstheorie/>; "Quantity Equation," Oxford Reference, accessed May 31, 2022, <https://doi.org/10.1093/oi/authority.20110803100357673>.

constant and only M is subject to change. This is not the case. Monetarists and Keynesians argue that V is not constant at all. It is subject to swings caused by fear, optimism, and uncertainty about the future.¹⁴⁷ It is hard to keep V constant as it is determined by perspectives and perceptions of the future. Incentivizing investing or saving of currency offers the opportunity to keep V constant. This could help keeping the quantity equation balanced and thus limit inflation. The quantity equation shows that to keep money value stable money supply and good supply must be kept in the right ratio.¹⁴⁸ With an algorithm that considers internal and external events it might be possible to keep the quantity equation balanced and thus tackle inflation.

(2) Monetary policy

As outlined above Hayek argues that with competition between currencies there would be no need for monetary policy. Monetary policy is used by governments and central banks to stir the economy. If there are several currencies circulating, there might be one which would be issued by a central bank. This could be used for monetary policy which governments decide to pursue. But in general, for crypto currencies there is no single entity like a central bank that could decide on its policy. Even if there is no single entity deciding on which policy to pursue there still is “monetary policy”. This would be the code which decides on the number of coins issued over time or the volume of currency circulating.¹⁴⁹ So instead of a monetary policy designed by humans we would have a monetary policy implemented into the code of the cryptocurrency.¹⁵⁰ The policy is set with the initial creation of the currency. There are proposals for currencies that adapt monetary supply according to market conditions to keep the value and purchasing power stable.¹⁵¹ With this we have

¹⁴⁷ “Quantity Theory of Money Definition,” Investopedia, accessed May 31, 2022, https://www.investopedia.com/terms/q/quantity_theory_of_money.asp.

¹⁴⁸ “Quantity Equation.”

¹⁴⁹ Robert Sams, “A Note on Cryptocurrency Stabilisation: Seigniorage Shares,” n.d., 5.

¹⁵⁰ Sams, 5.

¹⁵¹ Ferdinando M. Ametrano, “Hayek Money: The Cryptocurrency Price Stability Solution,” *SSRN Electronic Journal*, 2014, <https://doi.org/10.2139/ssrn.2425270>; “Terra Whitepaper - Whitepaper.io,” accessed April 22, 2022, <https://whitepaper.io/document/587/terra-whitepaper>.

algorithms deciding instead of individuals on the policy to pursue it. With Bitcoin we can see what the consequences of an outdated algorithm are. Bitcoin continues in the same patterns disregarding its own value.¹⁵² Bitcoin does not adapt to changes in the market well. Satoshi Nakamoto designed Bitcoin in a way that its issuance would follow its adoption.¹⁵³ Unfortunately, this is not the case and the demand for Bitcoin by far outpaces its supply. This makes Bitcoin a better store of value than a medium of exchange as it has deflationary tendencies.¹⁵⁴ Our currency would be governed by everyone who participates in it. They could make decisions regarding the functionality. Expanding or contracting supply of the currency would be dependent if the algorithm allows for such actions. The different tools of monetary policy such as open market operations or quantitative easing were neither possible nor necessary according to Hayek. Monetary policy in its conventional form could not easily be enacted with this currency. It is conceivable that a group of users want to change certain technicalities. We have seen this in the past already regarding the implementation of the Segwit protocol and/or the block size of each Bitcoin block. These discussions eventually led to a fork of the Bitcoin chain resulting in Bitcoin and Bitcoin Cash.¹⁵⁵ It is possible that within the community which uses scenario a's currency a group decides to change the algorithm. This might concern expanding the supply or de-/increase the speed of issuance. If a consensus is achieved, then the supply algorithm could be changed to fit economic needs. If no consensus would be reached a hard fork could occur. If that were to be the case, it might deal a significant blow to the market value of the original and/or the newly forked currency. Crypto currencies that take a communal approach don't make monetary policy impossible. These policies are determined by the underlying algorithms. Dissent on the future of the currency might

¹⁵² Sams, "A Note on Cryptocurrency Stabilisation: Seigniorage Shares," 5.

¹⁵³ Ametrano, "Hayek Money," 20–21.

¹⁵⁴ Ametrano, 18–20.

¹⁵⁵ Jack Parkin, "The Senatorial Governance of Bitcoin: Making (de)Centralized Money," *Economy and Society* 48, no. 4 (October 2, 2019): 479, <https://doi.org/10.1080/03085147.2019.1678262>.

pose a threat to the value of the corresponding currency though. I would argue crypto currencies allow monetary policy. It just takes a different virtue and might be harder to implement.

(3) Transparency increase?

Hayek mentions that with national currencies governments cannot act in the general interest. This stems from the fact that the mechanisms of democracy force the government to gain support of a sufficient number because only then it can win and form a majority government.¹⁵⁶ I argue that with a wide adoption of a decentral crypto currency an increase in transparency and eventually democracy could be achieved. If all transactions are made within different blockchain environments, then this leads to an increase in transparency. Citizens would pay their taxes with a currency of their choice. If government funds are received on a blockchain then the funds are automatically allocated to a government wallet.

People with access to this wallet could remain anonymous the allocation of these funds would not. One could see if the designated budget for one government project would arrive at that target. From there the interested public could trace the money further and see if it was properly used. If this weren't the case investigative proceedings could be implemented. In a blockchain environment every coin ever minted can be accounted for. If governments wish to finance a project, then a blockchain environment could be used to account for the funds being allocated.¹⁵⁷ If some go missing investigators could follow the money and hopefully lead to the person who committed fraud. Governments, NGOs and IOs all suffer from embezzlement of public money. A blockchain wouldn't automatically abolish fraud and embezzlement but would make public finances significantly more transparent.

It could also enable citizens to directly allocate funds to certain government projects. Each citizen must pay taxes. These taxes would be payable in different currencies corresponding to their value. Crypto

¹⁵⁶ Hayek, *Denationalisation of Money*, 103.

¹⁵⁷ "Blockchain as an Anti-Corruption Tool," U4 Anti-Corruption Resource Centre, accessed April 21, 2022, <https://www.u4.no/publications/are-blockchain-technologies-efficient-in-combatting-corruption>.

currencies could be directly transferred to projects. Governments would provide different projects in the need for funding. Taxpayers could then transfer a part of their total tax rate to that project. If that project is fully funded, then taxpayers would need to transfer to another project of choice. The option that the state receives taxes and distributes them would remain. But I argue that democracy and trust in liberal institutions is strengthened if taxpayers were able to trace their funds and see what happens to their money.

Privacy rules especially the data protection regulation in the EU could constitute a hurdle to this scenario. Transactions of individuals being recorded on a ledger and then being accessible to everyone could be a strong infringement on privacy. To tackle these privacy concerns and in compliance with anti-money laundering and KYC rules one could implement anonymity vouchers. This solution has been proposed along others regarding central bank distributed currencies, but it could also be implemented within any other currency.¹⁵⁸ Everyone would receive a fixed amount of nontransferable anonymity vouchers in recurring periods. An individual could use a voucher to hide certain details such as identity and transaction history of the corresponding transaction in front of a controlling authority. If no vouchers remain all transactions will be viewable.

ii) Problems

Switching to a world where currencies compete, and governments gave up control over currency might cause harm as well. I will not assess the problems of Hayek's argument itself but the ones which would be caused if his proposals were translated in a crypto currency environment. I won't focus on trivial considerations such as what happens if there is no internet or no power. I am going to assume that in the future power and internet provision will be stable even in regions where it currently is slow and unstable such as

¹⁵⁸ Jonas Groß, Manuel Klein, and Philipp Sandner, "Digitale Zentralbankwährungen: Chancen, Risiken und Blockchain-Technologie," *Wirtschaftsdienst* 2020, no. 7 (2020): 545–49.

rural and urban parts of Germany.¹⁵⁹ The problems I will be considering will be of moral, legal, and political nature.

(1) Governance

With a central bank there is a central institution that decides on monetary questions and the future of their monetary policy. Hayek envisaged a similar concept only that there were no central banks but private and public issuers of currency. These currencies would then be managed by these central institutions. One unifying element is that both have a central institution which unilaterally makes decisions. With the currency I outlined above no such unifying government body exists. Instead, everyone who wishes to participate in the development is free to do so. This might increase inclusion, but it causes several problems. First is that the individual who wishes to participate in a way to alter the code will need a deep understanding of code and computer programming. This already excludes many people who are not so tech savvy. If one wishes to amend the structure of the underlying code, they can do by submitting their proposal to a corresponding forum where it then would be discussed. From there one must differentiate between on chain and off chain governance. On chain governance is when a cryptocurrency offers a governance token which gives its holder a right to vote in governance decisions.¹⁶⁰

For scenario a) we will be using off chain governance. For off chain governance the stakeholders (miners, node operators, developers, and users) arrive at decisions by an informal way of discussion which hopefully results in a positive result.¹⁶¹ If the discussion arrives at a uniform result then the new code would be implemented by a formal procedure. This brief description already shows that for such community currency policy proposals are a lengthy process. In case of economic shock, it seems

¹⁵⁹ Pelle Kohrs, "Breitbandausbau: Warum das Internet in Deutschland so langsam ist," *Der Spiegel*, May 7, 2021, sec. Dein SPIEGEL, <https://www.spiegel.de/deinspiegel/breitbandausbau-warum-das-internet-in-deutschland-so-langsam-ist-a-4ae2e73a-0002-0001-0000-000176028069>.

¹⁶⁰ "Ethereum Governance," *ethereum.org*, accessed April 21, 2022, <https://ethereum.org>.

¹⁶¹ "Ethereum Governance."

unlikely that the community could quickly arrive at a decision to alter the policy of the currency. Hayek argues that with currency competition such monetary policy won't be necessary even in times of crises, I would argue that a quick response to crises would still be needed. This could result from an increased need for liquidity or a need for reduction of monetary supply. If the community would not arrive at a common decision, then we would either see no action being taken or a fork might occur. We saw such events take place in the past which resulted in the previously mentioned hard forks. Such a hard fork would pose a threat to the currency. From an economic point of view the threat of a fork would loom over a currency and might diminish the value of the currency prior to the fork. This seems unlikely but not impossible. We see the values of Bitcoin and Ethereum increasing (although subject to fluctuation). Both have been subject to hard forks in the past which created new currencies with significant lower values than their "mother" currencies. I see the bigger problem with hard forks is that people who decide to use the newly forked currency might lose significant amounts of value stored in money. One might argue that they decided at their own risk I would argue often people don't know of the consequences. Issues discussed are complicated technical or economic matters. It might happen that people who vote in the matter lack the necessary knowledge. Furthermore, we might see low voter turnout as we saw with the Ethereum fork.¹⁶² With low turnout it would be hard to justify such far reaching decisions as to form new currencies at the risk of their value.

Another governance issue could arise from the question of who amends propositions to the currency protocol. In theory everyone would be free to amend the code and make proposals. In practice this seems unlikely as amending the code to a blockchain algorithm is not an easy task. The underlying algorithms are complex mathematical equations. Moreover, one needs to master the corresponding programming language. This limits the circle of people writing code to a handful. Research has shown

¹⁶² "Ethereum Governance."

that for Bitcoin and Ethereum the people participating in the code writing are repeatedly the same people.¹⁶³ But this goes further. Research within the discussion threads has shown that it's not a diverse discussion but the same people amount for most of the postings and input.¹⁶⁴ The research on centralization within the crypto currency community is not sufficient.¹⁶⁵ This research still shows one of the key problems that few people are currently willing to invest time and work on a voluntary basis. With a currency that is used for everyday life and is of great importance to many people this poses a threat as the users in theory could participate but in practice might rely on a handful of developers. In the past this hasn't been used to abuse the currency. Hoping that it won't happen seems to be a risky bet. With a decentralized open blockchain platform it is not unlikely that a tech savvy new oligarchy emerges.¹⁶⁶ Experience with Bitcoin and Ethereum have shown that a technocrat elite emerges who control and run governance of the currency.¹⁶⁷

I would like to highlight that it seems reasonable that a decentralized network might be dominated by a few. The algorithm is incorruptible however the people using it are not.¹⁶⁸ People might cluster around charismatic leaders or form interest groups. This opens the door to open or hidden points of control.¹⁶⁹ For my scenario unaccounted elitist power poses a threat. With that the question of legitimacy arises. If such clusters were to form the question remains who holds them accountable. Hayek would probably answer market forces and competition with other currency. I think leaving currency at the will of a few being restrained only

¹⁶³ Marcella Atzori, "Blockchain Technology and Decentralized Governance: Is the State Still Necessary?," n.d., 27–28; Sarah Azouvi, Mary Maller, and Sarah Meiklejohn, "Egalitarian Society or Benevolent Dictatorship: The State of Cryptocurrency Governance," in *Financial Cryptography and Data Security*, ed. Aviv Zohar et al., vol. 10958, Lecture Notes in Computer Science (Berlin, Heidelberg: Springer Berlin Heidelberg, 2019), 8, https://doi.org/10.1007/978-3-662-58820-8_10.

¹⁶⁴ Azouvi, Maller, and Meiklejohn, "Egalitarian Society or Benevolent Dictatorship," 8–9.

¹⁶⁵ Azouvi, Maller, and Meiklejohn, 13–14.

¹⁶⁶ Atzori, "Blockchain Technology and Decentralized Governance: Is the State Still Necessary?," 27.

¹⁶⁷ Atzori, 27; Primavera De Filippi and Benjamin Loveluck, "The Invisible Politics of Bitcoin: Governance Crisis of a Decentralised Infrastructure," *Internet Policy Review* 5, no. 3 (September 30, 2016): 16, <https://doi.org/10.14763/2016.3.427>.

¹⁶⁸ Atzori, "Blockchain Technology and Decentralized Governance: Is the State Still Necessary?," 30.

¹⁶⁹ Atzori, 30.

by competition is a great risk. While eventually the market will punish malicious actions it might be too late as people will have lost their money by then.

(2) Efficiency

As discussed already the currency for my scenario would be governed by its users. Even if the previously described dystopia of a technocrat elite comes true then there still would be many actors involved in policy adaptations. If the need arises to adapt the algorithm in reaction to external events, then many actors would need to be heard. This could require extensive discussions until a result is accomplished. Time gives a chance to discussion, compromise, and solutions. It could also be a hindrance to adequate response. Without decisive action external events might doom the currency. Currencies managed by single institutions can respond adequately the community governed currency cannot. Hayek did not envisage a community governed currency but single institutions to issue currency. Those could adequately react by extending or contracting monetary supply. Our currency would be slow in reacting to external events. This could negatively affect its value in times of crises. People might abandon the currency and cause a downward spiral leaving the ones who are slow or unable to switch currencies vulnerable.

(3) Motivation of this currency?

What motivates people to “create” a currency? The creation of the currency in our scenario would be motivated by supplying people with a stable “good” decentral currency increasing financial inclusion. Hayek argued that good money is money that is not prone to inflation or deflation.¹⁷⁰ Within the cryptocurrency environment there have been many Ponzi or pump and dump schemes over the past. Users must be aware to not fall victim to such schemes. We will assume that our currency is solely motivated to create a good and efficient currency.

¹⁷⁰ Hayek, *Denationalisation of Money*, 23,95.

(4) Financial Inclusion

Financial inclusion means that individuals have access to useful and affordable financial products that serve their needs.¹⁷¹ This could be payment infrastructure, bank accounts, insurance, or credit.¹⁷² Experts believe that introducing a digital token and making it legal tender could increase financial inclusion.¹⁷³ According to the world bank around 1,7 billion people do not have access to a bank account.¹⁷⁴ They lack the financial possibilities necessary to participate in a modern economy. People without a bank account cannot plan for unexpected events, they also cannot access other financial services such as crediting or sending/receiving payments. Without bank accounts people are less likely to save money for future investments such as education or business expansion.¹⁷⁵ Greater financial inclusion would not only help the individual but also bolster economies of countries currently lacking economic growth. Reasons for little financial inclusion are extreme poverty, strict requirements for account holders, lacking presence of financial institutions, or lack of knowledge about financial services.¹⁷⁶ A digital token issued by private institutions could achieve greater financial inclusion. But only if the architecture of the currency aims at doing so. Our scenario just assumes that everyone with a corresponding wallet app can use the currency. Today the only type of currency that enables everyone to participate in everyday life is cash money. People using cash are excluded from most parts of the financial world, but it still enables them to pay and get paid especially in the informal economy. Cash still plays a fundamental role to the life of many people. In the US alone there are around 7 million people who have no bank account and rely on an

¹⁷¹ "Overview," Text/HTML, World Bank, accessed April 22, 2022, <https://www.worldbank.org/en/topic/financialinclusion/overview>.

¹⁷² "Overview."

¹⁷³ "Which Type of Digital Currency for Financial Inclusion?," Cato Institute, May 12, 2021, <https://www.cato.org/cato-journal/spring/summer-2021/which-type-digital-currency-financial-inclusion>.

¹⁷⁴ "Overview."

¹⁷⁵ "Overview."

¹⁷⁶ "Financial Inclusion," Corporate Finance Institute, accessed April 22, 2022, <https://corporatefinanceinstitute.com/resources/knowledge/finance/financial-inclusion/>.

infrastructure build around cash.¹⁷⁷ The reasons for this range from mistrust against financial institutions to lacking legal status and fearing repercussions if one were to open a bank account. Cash is important because it enables these persons to partially participate in everyday life. For my scenario competition in currency comes with a total switch to a digital environment. This could eventually mean the abolishment of cash. An abolishment of cash would exclude people who rely on cash from everyday life. Instead of a better financial inclusion such a move would achieve the opposite. We can spin this further that certain currencies cater to an exclusive audience. They do this to preserve value and maximize gains. Due to their internal customer policies certain groups of people are excluded. If this business model were to be successful other currencies might follow. This could leave people under- or even unbanked. Even worse some might suffer from no access to money at all if there was no more cash. Currently in the EU everyone has the right to open a bank account no matter if homeless, refugee or asylum seeker.¹⁷⁸ Many might not know this, but the law is in place, and it benefits everyone. It requires banks to allow everyone to open an account. If there are no more banks but digital currency issuers, it is necessary to ensure that they are forbidden to exclude certain groups of people.

(5) Conclusion

With its open source-based approach and focus on inclusion it might be able to sustain in a currency competition environment. Its openness and increased transparency are its greatest assets. Such values should be kept up and strengthened to ensure successful market participation.

c) Scenario b); a central approach

I have highlighted only a few of the chances and problems that come with a decentralized approach for currency. Those assessments drew heavily on

¹⁷⁷ "Which Type of Digital Currency for Financial Inclusion?"

¹⁷⁸ "Eröffnung eines Basiskontos innerhalb der EU," Your Europe, accessed April 22, 2022, https://europa.eu/youreurope/citizens/consumers/financial-products-and-services/bank-accounts-eu/index_de.htm; "Jeder hat das Recht auf ein Konto," Webseite der Bundesregierung | Startseite, accessed April 22, 2022, <https://www.bundesregierung.de/breg-de/aktuelles/jeder-hat-das-recht-auf-ein-konto-321068>.

comparisons with Bitcoin and Ethereum. Considerations regarding scenario b) will draw upon parallels with currencies such as Diem (formerly Libra) and XRP the native coin to the ripple network. I chose those two because both share a characteristic. Before Meta abandoned its efforts in Diem¹⁷⁹ it was managed by Meta the mother company to Facebook, WhatsApp and Instagram. XRP is managed by ripple labs, a US American technology company.¹⁸⁰ Both systems differ in their characteristics, and they serve different purposes. I will draw upon them because I want to highlight what risks and chances come with a denationalized centrally controlled crypto currency.

i) Chances

A digital currency that is issued by a central institution fits into what Hayek envisaged when he wrote his book. He imagined several currencies which would be offered in cash as well as bank accounts. These currencies would compete against each other. They would all be issued by different institutions. The management and decision making would take place within the corresponding institution. According to Hayek inflation and deflation would be a thing of the past as the currency competition would restrain the issuers. With a centrally managed currency we might also see an increase in efficiency when it comes to payment services. A company issuing its currency would be eager to back it up with the necessary technology. Only then it could outcompete its competitors. A profit driven corporation is motivated by its own survival and especially by greed to increase their business. Hayek acknowledged this already in the 70ies.¹⁸¹

I argue that financial inclusion might be restricted after a while in the beginning, we would see positive effects. Diem claimed that it would significantly increase financial inclusion and significantly reduce transaction fees.¹⁸² If financial inclusion were to be improved then a currency like diem would need to allow everyone to use it. Increasing its user base right after the launch is especially important. A currency profits from network effects. If

¹⁷⁹ "The Diem Association," accessed April 22, 2022, <https://www.diem.com/en-us/>.

¹⁸⁰ "Our Story | About Ripple," *Ripple* (blog), accessed April 22, 2022, <https://ripple.com/company/>.

¹⁸¹ Hayek, *Denationalisation of Money*, 51.

¹⁸² "The Diem Association."

more people use one currency, there are more options what the users can do with it. This creates a cycle where more users are attracted. A corporation has a significant interest in a strong user base right from the start. Lowering transaction fees would also be a factor that makes such a currency interesting. Currently bank transaction fees are ubiquitous.¹⁸³ If there were currencies which would lower these fees that would attract more customers. It would benefit the public who previously had to pay high fees for simply transferring money from one to another account.

Such a currency might be better in sustaining their value. One of the key characteristics of Diem was that it was supposedly a stable coin. It would have been backed up by a variety of financial assets.¹⁸⁴ This was supposed to ensure the stability of the value. Unlike Hayek we have a crypto currency being backed 1:1 by fiat currency. I am going to assume that the proposals put forward by Meta to back their currency with fiat money were mostly to ease central bankers and politicians about their ambitions. The Diem corporation would not create new net money since it would issue or burn Diems according to market demand.¹⁸⁵ These were then backed with fiat currencies. Thus, no new money would be created.

Hayek argued that solely competition would determine the value of a currency. The value should be determined regarding purchasing power of different commodities.¹⁸⁶ Unlike his proposals Diem would have been backed by fiat currency in the beginning. This can only be the case if there are fiat currencies. If states denationalize currency, then no institution would be required to back their currency with fiat currency.

Contrary to traditional banks tech companies seem to be more trusted when it comes to handling money. Tech companies are treated with leniency and enjoy a positive reputation. Little do customers know what happens to their

¹⁸³ "Per-Transaction Fees," Investopedia, accessed May 30, 2022, <https://www.investopedia.com/terms/t/transaction-fees.asp>.

¹⁸⁴ "Economics and the Reserve | Diem Association," accessed April 22, 2022, <https://www.diem.com/en-us/economics-and-the-reserve/>.

¹⁸⁵ Ivan Pupilizio, "From Libra to Diem. The Pursuit of a Global Private Currency," *Global Jurist* 0, no. 0 (2021): 12, https://www.academia.edu/59274814/From_Libra_to_Diem_The_Pursuit_of_a_Global_Private_Currency.

¹⁸⁶ Hayek, *Denationalisation of Money*, 26–27.

data. They often also remain in the dark about how they are influenced by algorithms. If currency were to be denationalized these companies would enjoy a great user base. They would benefit from the trust people put in those companies. I argue that the enormous user base is the most important asset these companies have. With the enormous user base, they profit of network effects.¹⁸⁷ People enjoy the comfort of the environment these companies created. This makes them less likely to switch to a different platform. If a company with a user base of about 1 billion people issues a currency, then it would have a head start. It seems likely that many of these people using the other services would also use the newly minted currency.¹⁸⁸ This would mean users would have many options to pay with this private currency. If there were many options, then people would also regard this currency more valuable as it would offer more options to be utilized. With their technological background tech companies might also have the chance to improve on services such as transaction speed, transaction cost and user friendliness.

ii) Problems

But with tech companies, banks/payment providers (VISA, Mastercard) and other corporations issuing currency there are not only chances but also problems that come with it.

(1) Meaningful investment

Monetary control enables states to pursue different projects. In democratic states elected governments deem different projects worthy to pursue. This can range from social reforms to infrastructure investment or investment in sustainable development. In democratic states this means that each citizen can participate in the decision-making process on what the government should spend money on. I have outlined previously that government spending could be made more transparent via crypto currencies.

¹⁸⁷ Ravi Kumar, "Understanding the Basics of Network Effects — The Power of the Platform," *Products, Platforms, Business & Innovation in Industry 4.0/IIoT* (blog), July 30, 2018, <https://medium.com/world-of-iiot/understanding-the-basics-of-network-effects-the-power-of-the-platform-2cfef215fe4a>.

¹⁸⁸ Kumar.

But if states loose monetary control they might also loose the opportunity to refinance themselves at favorable conditions. If a government wanted to invest into infrastructure, they were obliged to borrow from private currency issuers. They might subject the government to unfavorable conditions. Thus, the governments investment opportunity would be reduced. Less government spending would eventually harm the individual. According to Hayek the individual would profit from denationalization as they would gain the opportunity to choose from different money. I argue that the individual is reduced in its opportunities. An individual might be able to choose from different currencies suggesting choice while effectively being reduced to a mere customer of currency. The individual would still be able to vote. But they might lose the power to decide on what the government spends money because the government lost this option. This scenario seems especially likely as I believe we would see little competition, but a few big companies issue currency. Then these companies could dictate the conditions on the use of their money. Contrary to democratic governments individuals would have little say in how and where money is spent. To Hayek the denationalization curbs the power of governments I argue it deprives democratic governments of important tools and restrains the power of the individual.

(2) Governance

As already discussed, current monetary policy is governed by central banks. The people making decisions regarding the future of each currency are appointed by a government. In democratic states where there is functioning judiciary the central bankers are supposed to be independent from the government. In the EU the ECB is tasked with this mandate. If there were no national currencies this would drastically alter the governance processes of currency. Hayek argues that there would be no need for monetary policy as a value of currency would solely be determined by competition. He acknowledges that there would still be a need for decisions such as extending or contracting monetary supply. In

this scenario the issuing institution would make these decisions internally.

I will continue his train of thought.

If there were corporations who would provide currency to the public their motivation would be to maximize profit.

To do so they would need to keep their currencies' value stable, attract more users and improve the functioning of their currency. These goals seem honorable and as they would benefit the consumer. But things might change if a currency enjoys significant market share. Then users are embedded in the corresponding currency universe. This could make it harder to switch from one to another.¹⁸⁹ A company might capitalize on their dominance to make decisions which maximize profits while penalizing its users. This could be extending monetary supply to attract a broader user base. Such extension would lower the value of the currency. New users could be attracted with such a decision as they could buy the currency for cheaper. "Old" users would lose as their accounts would suffer the loss of purchasing power.¹⁹⁰

In the past we saw examples of tech companies promoting their own services to the disadvantage of its customers. One example is the altered listing of search results which always listed google shopping as one of the most important results despite better offers.¹⁹¹ If a corporation is issuing a currency, then the governance of the currency might be regarded as company secret. I argue that a company would keep the algorithms, which run the currency, a secret. We see similar patterns with the google search algorithm or the ones deciding what users see on Instagram.¹⁹²

Companies have argued in the past that this is necessary to prevent

¹⁸⁹ William J. Luther, "Cryptocurrencies and the Denationalization of Money | AIER," accessed April 25, 2022, <https://www.aier.org/article/cryptocurrencies-and-the-denationalization-of-money/>.

¹⁹⁰ Luther.

¹⁹¹ Alexander Fanta, "Google Shopping: EU-Gericht bestätigte Milliardenstrafe," netzpolitik.org, November 10, 2021, <https://netzpolitik.org/2021/google-shopping-eu-gericht-bestaetigte-milliardenstrafe/>; Prabalagrawal, "How Big MNC's like Google, Facebook, Instagram Etc, Stores, Manages and Manipulate Thousand Of...", *Medium* (blog), September 17, 2020, <https://medium.com/@prabalagrawal3/how-big-mncs-like-google-facebook-instagram-etc-stores-manages-and-manipulate-thousands-of-6cdc23d684f1>.

¹⁹² Adrian Lobe, "Strategien der Digitalkonzerne: Gebt die Algorithmen frei!," *FAZ.NET*, accessed April 25, 2022, <https://www.faz.net/aktuell/feuilleton/medien/digitalkonzerne-geschaftsgeheimnis-algorithmus-15072713.html>.

people from exploiting the algorithms or to protect freedom of speech.¹⁹³

I argue that it is likely that we would see similar behavior when it comes to the issuance of a digital currency. Scenario a) took a community-based approach where the code is made public and subject to peer review and open to participation. I believe that companies are less likely to be that open with their code. If no one knows what's in the code that leaves it up for manipulation and deliberate altering.

(3) Centralization

Hayek argued that the monopoly of central banks is the root of all monetary evil. In Hayek's scenario competition between currencies is vivid. I am going to paint a different picture. As with many services today, especially in the digital world I believe we are going to see a centralization of services. We are currently seeing such centralization. Few companies control most of the platforms people enjoy using.¹⁹⁴ As already outlined they can capitalize on network effects. This is one of the issues why newer platforms struggle with taking off. There are alternatives not enough people use them as they lack the necessary network or data the big companies can offer. Messenger services or social media platforms are only interesting if there are other people using these platforms. Currently there is no obligation for platforms to create an intersection so smaller platforms can interact with the established big ones.

If companies were allowed to offer currency, I believe similar patterns would occur. Big companies which already have strong user bases have access to vast amounts of data showing what people "want". This data could be used to build a currency tailored to customer's needs. The data tech companies, and payment providers process every day would give huge advantages to these corporations.

¹⁹³ Lobe.

¹⁹⁴ Analyse / Muzayen Al-Youssef, "Das Web, clean, zentralisiert – und langweilig," DER STANDARD, accessed April 25, 2022, <https://www.derstandard.at/story/2000113525447/wenige-plattformen-fuer-alles-das-web-clean-zentralisiert-und-langweilig>; "US Tech Giants Accused of 'Monopoly Power,'" *BBC News*, October 6, 2020, sec. Business, <https://www.bbc.com/news/business-54443188>.

Tech companies have enormous financial resources to finance their undertakings or simply buy competitors (Facebook bought WhatsApp and Instagram, Amazon bought several publishers and competing service providers¹⁹⁵). If there were companies unwilling to sell their assets, then tech companies quickly could include their previously original features (Similar happened when Facebook implemented the functions of snapchat in their product). All this would limit competition and eventually lead to centralization again.¹⁹⁶ Few companies would control the currencies being used. This is one of the flaws Hayek neglected and which he was criticized for.¹⁹⁷ If that were to happen then this single entity could just fall victim to the same issues Hayek has with central banks.¹⁹⁸

(4) Gatekeeper in a digital world

Advocates of capitalism and liberal market principles tend to argue that even the digital world offers possibilities for new companies to disrupt the market. They are quickly to give examples when a new innovative company challenged old powerful companies only to eventually outperform them. I argue that this does not apply anymore. The big technological companies are equipped with massive technological and financial resources. They control who gets access to resources and what consumers get access to. Google is a gatekeeper for finding and accessing websites, Meta (and each social media network) is a gatekeeper for access to individuals. Amazon is a gatekeeper for access to customers. They all perpetuate their position as such by making other companies increasingly dependent on its services.¹⁹⁹ With their capability as gatekeeper they have enormous power over competition. Some people already are wary of using the big tech corporations' services, but they remain a minority. Most people use their products because it's

¹⁹⁵ "Understanding Amazon: Making the 21st-Century Gatekeeper Safe for Democracy," American Economic Liberties Project, accessed April 25, 2022, <https://www.economicliberties.us/our-work/understanding-amazon-making-the-21st-century-gatekeeper-safe-for-democracy/>.

¹⁹⁶ Paolo Savona, "Prospects for Reforming the Money and Financial System," *Open Economies Review* 33, no. 1 (February 2022): 6, <https://doi.org/10.1007/s11079-021-09628-4>.

¹⁹⁷ Pupolizio, "From Libra to Diem. The Pursuit of a Global Private Currency," 20.

¹⁹⁸ Pupolizio, 20.

¹⁹⁹ "Understanding Amazon."

convenient and they are relatively good. I do not believe that with such dominance competition would be fair. We have seen unfair practices in the past with companies such as Google, Facebook/Meta, or Amazon. I believe similar practices would occur with the issuance of currency. I believe that there might be some competition at the start but soon few companies engaging in the issuance of currency would quickly take over and control it for the foreseeable future.

(5) Motives

The ECB, the FED and most other central banks aim to accomplish the three goals of monetary policy, price stability, maximum employment, and stable long term interest rates.²⁰⁰ In theory an independent central bank wants to achieve these goals to the benefit of the citizens, businesses, and economy of a country. The decisions of a central bank are motivated by economic motives and maybe altruism.

What are the motives of companies that issue currency? Hayek argues that instead of economic motives companies act out of self-interest.²⁰¹ Self-interest might be a good motivation for business. Contrary to Hayek I am skeptical whether it is good for the public. In the past we have seen a myriad of events where companies acted out of self-interest but to the disadvantage of the public. We have seen companies neglect safety standards to save money, abuse its employees to maximize profit or cause environmental harm etc. I am critical that self-interest would give us money that is better than the one we currently use.²⁰²

8) Necessary Regulation

After extensive discussion of the two scenarios and its threats and chances I want to give an outlook on what regulation would be necessary if such a system were to be ever implemented. These recommendations are only examples of extensive regulation. They shall address the main problems I have previously analyzed. I am going to limit my recommendations on a European perspective. I will assume that

²⁰⁰ Bank, "Introduction"; Friedman, "Monetary Policy"; "Monetary Policy Basics," accessed April 26, 2022, <https://www.federalreserveeducation.org/about-the-fed/structure-and-functions/monetary-policy>.

²⁰¹ Hayek, *Denationalisation of Money*, 9, 51.

²⁰² Pupolizio, "From Libra to Diem. The Pursuit of a Global Private Currency," 20.

the EU will continue to exist and the legislative division between national level and EU level will prevail. In the EU law making competences regarding monetary decisions have been transferred from the national state to the EU level according to Article 3 (1) c TFEU. The EU has the sole competence for laws regarding monetary matters.

a) Competences

If the EU would decide to denationalize their currency area who would have the competence to set the rules for this area? Currently the monetary competences are regulated in the TEU and TFEU. Article 3 and 13 TEU establish the ECB and ECSB. In article 127 TFEU sets the competence of the ECB and the ECSB. Article 128 Section 1 sentence 3 TFEU declare Euro bank notes the only legal tender of the EU. Important provisions governing the European monetary systems are Articles 3(1)(c), 119, 123, 127-134, 138-144, 219 and 282-284 of the TFEU. These provisions along with the statute of the ECB and ECSB make up the rules for the European monetary system. If currency were to be denationalized, then the statute of the ECB/ECSB needed change. More importantly the TFEU and maybe even the TEU needed change. If the treaties of the EU were to be changed then Article 48 TEU would come into play. This would pose a great challenge because the Treaties of the EU can only be changed unanimously according to Art. 48 (4) 2, (7) 4 TEU. I will assume that the EU arrives unanimously at the decision and changes the treaties.

b) Changes

For a denationalized currency are I am going to propose several changes to the TFEU. With such changes a basic functioning of a competing currency system could be safeguarded.

i) Abolishing legal tender laws

Currently one of the most important laws regarding currency in the EU is Article 128 TFEU. Article 128 1 (3) TFEU establishes Euro banknotes as the only legal tender in the EU. This law needed to be abolished. If the EU wanted to implement a system of competing currencies, then there must not be a law

in place which sets one currency as legal tender.²⁰³ Instead of obliging citizens to accept the Euro as fulfillment of debts contractors should be allowed to choose which currency they would accept. If Article 128 1 (3) TFEU were to be abolished, then corporations and individuals were free to issue currency. Individuals were also free to accept or reject certain types of currency without risking the loss of the debt. Such measure could only be achieved unanimously according to Article 48 6 (3) TEU the ECB must be heard. Afterwards the national parliaments of the member states must agree to the changes acc. to Art. 48 6 (4) TEU. This poses a great challenge as I don't believe that national banks would be willing to fully give up their monopoly on monetary policy.

ii) **Regulatory necessities**

If the Euro were ever to be abolished as legal tender, then a different approach towards regulation would be necessary. A variety of rules would be necessary to ensure functioning of the new currency system. I will outline a few rules that I believe are crucial.

(1) **Disclosure of algorithms**

Instagram's news feed, the Google search or the recommended section in Amazon all rely on different algorithms. These algorithms supposedly show what is most relevant to the individual user. Meanwhile these algorithms are a well-kept secret, justified with business secrets or intellectual property law. Policy makers in the US and the EU have recognized this, they are now pushing for legislation which would oblige the tech companies to disclose their algorithms.²⁰⁴ If we were to see a wide adoption of digital currencies then they would be based on algorithms. As described in scenario a) a community governed currency with a DAO to govern it would disclose its algorithm to the public. I argue that we would also see private companies offering currency. If we look at the current behavior of tech companies and their hesitancy to

²⁰³ Hayek, *Denationalisation of Money*, 36, 37.

²⁰⁴ James Vincent, "Google, Meta, and Others Will Have to Explain Their Algorithms under New EU Legislation," The Verge, April 23, 2022, <https://www.theverge.com/2022/4/23/23036976/eu-digital-services-act-finalized-algorithms-targeted-advertising>.

disclose their algorithms and business practices, then I argue we would see similar patterns with the issuance of currency. If the issuing companies were obliged to disclose their algorithms fully or at least partially, then transparency would increase. Experts and users could evaluate the features and security of a currency. This would allow a deliberate decision whether to use the currency or not. I propose that a regulation should also include that companies publish log files describing changes that they plan to implement in their currency. This will allow users to switch currencies if they disagree with such changes. Companies would also profit as they would receive valuable feedback. In case users would be unhappy with the planned changes then they would be able to engage in discussion instead of users abandoning their currency. The EU has recently passed the digital markets act and the digital services act.²⁰⁵ Both regulations include laws that aim at increasing transparency. The EU should draw on these laws to implement similar regulation in case currency were to be denationalized. Proposals by other authors go even further. They claim that IT protocols and DLT should be considered public goods.²⁰⁶ This would mean that the production of each of these technologies is guaranteed by the state.²⁰⁷

(2) Ensuring interoperability

One of the essential features of cash today is that it is widely accepted. Cash works domestically but it can also be used abroad. It can be exchanged to a different currency if one travels to another country. A similar feature must be implemented for denationalized currencies. Companies issuing currency must be obliged to ensure interoperability. This means all technical features which stop or limit currencies from being traded or exchanged for different currencies must be made illegal. Such

²⁰⁵ “DSA: Commission Welcomes Political Agreement,” Text, European Commission - European Commission, accessed April 27, 2022, https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2545; “Gesetz über digitale Märkte (DMA): Einigung zwischen Rat und Europäischem Parlament,” accessed April 27, 2022, <https://www.consilium.europa.eu/de/press/press-releases/2022/03/25/council-and-european-parliament-reach-agreement-on-the-digital-markets-act/>.

²⁰⁶ Savona, “Prospects for Reforming the Money and Financial System,” 7.

²⁰⁷ Savona, 7.

features would not only go against Hayek's vision of free competition they would also impeach on civil rights of EU individuals. The EU treaties safeguard the right to property in article 17 of the charter of fundamental rights of the EU which are part of the EU treaties. Limiting the spending options of one constitutes a severe infringement of the right of property. Money is part of one's property no matter the origin it has. Individuals might freely dispose of their property. If they cannot use a currency to buy another currency, the right to property is infringed as they cannot dispose freely of it.

As outlined big tech companies profit immensely of network effects. Overcoming these network affects can be achieved with ensuring interoperability. The EU commission has acknowledged this. With the DSA the big tech companies will be obliged to allow smaller services to interoperate with the big tech services. Such interoperability should also be enabled by law and not just a company's good will.

(3) Monopolies

Competition of currencies can only thrive if there are different currencies to choose from. Hayek does not address the case in which monopolies form in the currency market. I believe we would see a tendency towards a few big issuers of currency. This might seem counterintuitive if one looks at the current crypto currency market. But if people and businesses were to widely adopt digital currencies, they would pick a few and we would likely see a market with few powerful currency issuers. I argue we would see an oligopoly form. In such an environment it is hard for new companies to gain a foothold. Also, companies might abuse their market predominance. To counter this EU antitrust supervision needs to be strengthened. Only with efficient and strong supervision the exploitation of dominant positions in the market can be prevented. The ECB could be mandated with supervision of the currency market. The ECB could then compliment antitrust institutions in the EU. This new mandate should be encoded in the TFEU. This would prevent questions of legitimacy which

have been stated in the past when the ECB was tasked with banking supervision.

(4) Governance

The governance of the currency in both scenarios poses chances and threats. In Scenario a) a transparent governance mechanism is implemented it is slow and lacks efficiency. Scenario b) has a much more efficient decision making proceed but lacks transparency. I propose that a regulation needs to be implemented requiring currency issuers to disclose their governance mechanisms. For a DAO it would be necessary to disclose the number of participants and the distribution of voting rights. For centrally managed currencies the companies could be obliged to publish the who and who of decisionmakers, their considerations and their final voting. The voting or decision-making processes should not be subject to secrecy. This would allow for greater accountability of the individuals making decisions.

(5) Financial Inclusion

I argue that besides interoperability a rule guaranteeing financial inclusion is of utmost importance. As I have already outlined cash empowers basic market participation for everyone. This function of cash today must be translated into something comparable in the future. Everyone should have a claim for a wallet to hold currency. If the individual lacks the financial power to hold a smartphone than the wallet must be issued in another form (Card, USB-Stick, SD-Card). Such devices exist already today. The individual could then receive and send currency in some form. This would enable him/her to pay or get paid. It would allow for people who are unemployed and rely on welfare or donations to receive such. Such law could be comparable to the EU regulation giving everyone a claim to a bank account. If everyone had the right to a digital wallet greater financial inclusion could be achieved.

With the introduction of digital currency greater financial inclusion could be achieved. Around the globe up to 2 billion people work in the informal

sector and rely heavily on cash according to a study conducted by Visa.²⁰⁸ Accordingly many of these people lack financial inclusion. But this is not only an individual problem but also an economical as the informal sector constitutes up to 23% of global GDP.²⁰⁹ Over time measures fostering digital transactions have proven more effective than law enforcement measures. The promotion of digital payments in form of rebates on VAT or the support for digital payment terminals have shown to increase financial inclusion.²¹⁰ With greater financial inclusion the individuals benefit as their working conditions improve, they get access to healthcare and to the financial world. Businesses and governments profit as they benefit from fairer competition and greater tax revenue. If currency were to be denationalized financial inclusion in some form must be guaranteed.

(6) Other regulation needed

Outlining every legal requirement for the implementation of a denationalized currency would go far beyond the scope of this paper. Regulation concerning privacy and the governance of private data would be needed. Furthermore, states must implement regulation addressing the question of payment of taxes as well as court settlements. One could also think about regulation considering the liability of a company deliberately altering their currency and the reimbursement in the case of losses. State institutions should also think about capping fees for currency exchanges or payment transfers.

9) Conclusion

I have outlined Hayek's basic argument extensively. His proposals seem radical but the advent of Bitcoin and blockchain goes far beyond what Hayek envisaged. He proposed a denationalized system of competition where companies are the stakeholders. Today we see not only a denationalization but also a decentralization. If blockchain technology will take off in a way many have stated, then we will see a change of payment environment going far beyond Hayek's proposals. If this is the

²⁰⁸ "Digital_payments_and_the_global-Informal-Economy-Report.Pdf," 6–7, accessed April 27, 2022, [https://navigate.visa.com/\\$/v/2/m/x/Digital_payments_and_the_global-informal-economy-report.pdf](https://navigate.visa.com/$/v/2/m/x/Digital_payments_and_the_global-informal-economy-report.pdf).

²⁰⁹ "Digital_payments_and_the_global-Informal-Economy-Report.Pdf," 7.

²¹⁰ "Digital_payments_and_the_global-Informal-Economy-Report.Pdf," 26–29.

case, then big companies most likely are going to jump on that train. With these companies comes risk and threats to the individual and society. Ever increasing power with the control over currency poses a big threat. Governments and states should be wary. I don't believe that with a switch to digital currencies all monetary problems would be solved. I argue that it would be very likely that we see strong centralization of currency issuer. This could fragment society, lead to greater financial exclusion, less transparency and might even shatter democracy itself. These findings lead me to the answer that currency should not be denationalized only to be replaced with competing digital currencies.

Governments have acknowledged the risks and chances posed by digital currencies and the big tech companies. They are acting on social media and algorithms now. One should hope that it won't take as long as it took with the DSA and DMA for regulators to act on digital currencies. Otherwise, it might be too late.

Instead of denationalizing currency I argue Central banks should engage in a monetary policy that benefits the people and not only a few interest groups.

Alongside there can be other currencies people are free to use but this would happen at their own risk. Central banks and state currencies should not vanish but rather refocus on the needs of the people.

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