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Forking Finance:
How Bitcoin is changing the financial industry, Bit by Bit.

by

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ABSTRACT

I analyse qualitative interviews with key players along with news articles and industry reports to argue that cryptocurrency technology contributes to decentralization in the financial industry by gradually transforming key industry institutions. I draw on institutional theory to point out that institutional change takes many forms and does not happen overnight, and I mobilize the theory of forking to argue why cryptocurrency has not provided as radical an alternative to conventional currencies as many have claimed. This is because cryptocurrency has instead replicated and altered key elements and structures in ways that incrementally alter the path of the financial industry into the future. To make this argument I contribute the distinction between internal and external decentralisation within the financial industry. I apply sociotechnical theory and the theory of proto-institutions to outline how cryptocurrency technology increases internal decentralisation in the financial industry by introducing and normalizing new practices internally within industry players. I apply the theory of robust action strategies and legitimisation to explain how new practices are established between industry players to shape players' external environment. I do this by showing how cryptocurrency technology presents itself as a superior product which can replace middlemen and establish new relationships between the remaining players. By identifying these two types of decentralisation, I highlight ways in which cryptocurrency technology has increased decentralisation in the financial industry which are frequently overlooked. I show that cryptocurrency impacts both in different ways but in both cases works on and redefines the key institutions of the financial industry.

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CHAPTER 1: INTRODUCTION

"The technology behind cryptocurrencies has possibilities beyond currency and payments and thus it does have the potential for decentralisation to affect most if not all aspects of the financial industry" (Swan, 2015)

Within this thesis, I analyse how the introduction of cryptocurrency technology has impacted the level of decentralisation within the financial industry. I develop a distinction between internal and external decentralisation so as to explain the impact of cryptocurrency on the key institutions of the financial industry. Using this perspective of decentralisation in the financial industry, I conclude that cryptocurrency is decentralising the financial industry based on the nature of the technology itself which necessitates more decentralised behaviour, as well as the strategic efforts of its proponents to increase familiarity and normalisation of the technology.

Swartz and others have defined cryptocurrency as a decentralised, peer-to-peer network that allows for electronic cash to be sent as irreversible payments from one party to another without the need for intermediary parties (Swartz, 2018). It rests on three key features, which are a currency token, the payment rails for exchanging those tokens, and a distributed ledger-keeping protocol called the blockchain (Swartz, 2018). The former two are the specific elements of a cryptocurrency, while the latter can also be used for non-financial applications. Throughout this thesis, the term cryptocurrency will not refer to any specific coin, such as Bitcoin, but will refer to the general technology that meets the definition above and displays all three of the above-mentioned features.

An understanding of the origins of cryptocurrency helps to contextualize the significance and contribution of my argument in this thesis. In 2009, an anonymous individual who called themselves Satoshi Nakomoto, released the first ever cryptocurrency, called Bitcoin. Nakomoto designed this new currency to provide an alternative to the present financial industry as a direct response to the 2008 recession, which Nakomoto deemed was the fault of major players within the industry. This period of time marked the unfolding of the global financial crisis which significantly undermined trust in

government institutions as well as the mainstream financial system while also being a period marked by the increase of information surveillance due to the rise of social media business models which capitalized on personal data (Swartz, 2018). These two factors prompted hostility towards the financial system and called for a rethinking of both money and the financial system as a whole.

Cryptocurrency attempts to present just that, by providing an alternative to the current financial system. Proponents of Bitcoin and cryptocurrencies in general argue that centralisation was an effective solution for a certain period of time, but this is no longer the case. In particular, many point to the 2008 recession as a perfect illustration of the problems of the conventional, centralised financial system, where too much power resided in the hands of individuals and their organisations, to the financial detriment of millions globally. Authors such as Atzori (2015), Swan (2015) and Maurer, Nelms and Swartz (2013) point to the inefficiencies of centralised models given the technology available for decentralised models that can introduce cost and time efficiencies to processes to the benefit of both financial service providers and their end users. Lastly, others again, point to the poor economic management of many national currencies as evidence of the lack of financial control of consumers whose assets' value is subject to economic policies they may not agree with.

As a result, researchers such as Maurer, Nelms and Swartz (2013), Atzori (2015) and Swartz (2018) identify that proponents of cryptocurrencies advocate for the development of a decentralised financial system through the introduction of cryptocurrencies for several reasons. They believe that the technology behind cryptocurrencies can provide a superior value offering through faster and cheaper services (Swartz,2018). Moreover, Maurer, Nelms and Swartz (2013) propose that an additional reason is that these services wouldn't be monopolised by unnecessary middlemen who demand a fee for their services, and who also control the ability of consumers to transact and trade with their finances. Lastly, Atzori (2015) and Maurer, Nelms and Swartz (2013) identify that proponents want the choice not to engage with financial systems controlled by economic policies they feel do not benefit them and believe cryptocurrency's decentralised financial system can give them this.

However, despite the radical change and impressive benefits cryptocurrency promised to bring, its adoption and usage is still extremely low, as evidenced by the fact that most people do not use cryptocurrency in their daily financial transactions. There are several reasons for this. First and foremost is the bad reputation cryptocurrency has earned itself through its initial unintentional association with illicit activities due to its popularity amongst criminals and as a method of payment on the infamous SilkRoad. This reputation has prevailed despite the cryptocurrency industry's movement away from such dealings. Secondly, regulation has proved to be a difficult obstacle for cryptocurrencies to overcome, as regulatory bodies across the globe wrestle with how to approach regulating this new technology. This adds to cryptocurrency's negative reputation, giving the impression to many that rather than just being unregulated, they are in fact too dangerous to be involved with since regulatory bodies won't engage with them. Lastly, cryptocurrencies pose a substantially different approach to money, which can be difficult for regular consumers to process and accept, and thus there is an educational barrier, whereby users must overcome a steep learning curve in order to interact with cryptocurrencies. Cumulatively, these factors combine to temper cryptocurrency's impact on the financial industry, despite its large potential.

In this thesis, I will explore the extent to which cryptocurrency actors and advocates have achieved their original objective of decentralising the financial industry in spite of the obstacles listed above. I argue that despite its apparent lack of success based on its low adoption, cryptocurrency has increased the level of decentralisation within the financial industry. To do this, I draw on multiple sources of institutional theory, including but not limited to Lawrence, Hardy and Philips (2002), Hargadon and Douglas (2001) and Battani (1999), and use their theories and frameworks to establish the financial industry as a set of institutions which are influenced and altered to instigate change. Drawing on sociotechnical theory from Latour (1990) and DuGay (2007), theory of proto-institutions from Lawrence, Hardy and Phillips (2002), robust action strategy theory from Hargadon and Douglas (2001) and lastly, legitimisation theory from Zimmerman and Zeitz (2002) I outline how change is introduced to institutions, resulting in the increase of decentralisation within the financial industry.

I find that sociotechnical theory and theory of proto-institutions can be applied to explain the increase of internal decentralisation as the technology requires a change towards decentralised behaviour, and proto-institutions explain how these changes become normalised and disseminated across the industry. Moreover, I find that robust action strategy theory and legitimisation theory explain how cryptocurrency technology helps to familiarise incumbents with and normalise decentralisation as an approach within the financial industry. This then contributes to external decentralisation by increasing their legitimacy and consumers' familiarity with the technology so as to eventually legitimise their claim to offer a superior product and eliminate competitors. They largely achieve this by presenting cryptocurrencies through processes and in language that consumers are familiar and comfortable with, but also through manipulating their perceptions, primarily through strategic partnerships.

1.1 Research Question

The following question will guide my exploration of this thesis study:

Research question
How has the introduction of cryptocurrency technology impacted the level of decentralisation in the financial industry?

In order to answer this question, I will first investigate whether there has been an increase or decrease in the level of decentralisation within the financial industry as a result of the introduction of cryptocurrency. Based on these findings, I will then explore how changes to the level of decentralisation have been achieved by the introduction of cryptocurrency technology.

1.2 Thesis Structure

Chapter 1: Introduction

Chapter 1 introduces the concept of cryptocurrencies and their connection to decentralisation. Additionally, it gives an overview of my main findings, points of analysis and conclusion. Lastly, I also introduce my research question and the structure of this thesis.

Chapter 2: Methodology

Chapter 2 focuses on my methodological approach and the decisions that shape my research. It outlines my philosophical perspective, research approach, research design, research methods, approach to data analysis, limitations and biases and remarks on my research quality. The purpose of this chapter is to provide an understanding of how I conducted my research and knowledge is produced in this thesis.

Chapter 3: Literature Review

Chapter 3 provides an understanding of my field of research as well as to approach the answer to my research question from the perspectives of existing literature. I have categorised the literature into three parts, being literature relating to cryptocurrency, literature relating to institutional theory and literature relating to sociotechnical theory.

Chapter 4: Findings

Chapter 4 serves to outline the findings arising from my data collection. I present these findings in three four distinct categories, being decentralisation, current perspectives of old and new industry players, future predictions and strategy. Findings within the decentralisation category outline all insights in relation to cryptocurrency's relationship to decentralisation and what decentralisation means to people. Findings with the current perspectives section highlight the change of perception of cryptocurrency from its introduction to now, as well as providing information on interviewee's current perspectives on cryptocurrency. Findings within the future predictions category outline the future predictions for cryptocurrency that interviewees had, and lastly, findings within the strategy category provides insights into the tactics being employed by cryptocurrency to introduce changes in the financial industry.

Chapter 5: Analysis

Chapter five focuses on analysing my findings through the application of several theoretical frameworks. The first section presents an initial analysis of my findings to show that decentralisation

has increased across incumbent players, and thus also within the financial industry. The next section focuses on using the theoretical frameworks presented by the authors introduced in the literature review, including Lawrence, Hardy and Philips (2002), Zimmerman and Zeitz (2002), Hargadon and Douglas (2001), Latour (1990) and DuGay (2007). In the final section I illustrate how my conclusions from the previous section show how cryptocurrency has incurred a positive change in decentralisation levels in the financial industry by tackling it at the core and altering the institutional infrastructure.

Chapter 6: Concluding Discussion

Chapter 6 suggests answers to my research question by presenting my main conclusions derived from my findings and analysis. Furthermore, it addresses potential criticisms of my interpretations and analysis in the 'discussion' section. Lastly, I introduce areas for further research within this topic.

CHAPTER 2: METHODOLOGY

Within this thesis, I analyse the progression of decentralisation within the financial industry post-cryptocurrency's introduction, through examining the impact on institutional infrastructure. To do this requires gathering data on the financial industry's institutions and then identifying changes visible amongst them since the introduction of cryptocurrency. Lastly it requires collectively assessing any changes to detect patterns or trends which could support the hypothesis that decentralisation has been progressed by cryptocurrencies. In order to do this, I have employed a specific methodological approach, which I lay out below.

In the following section I will describe my methodology for designing and approaching my research, how I collected and analysed my data and an evaluation of my research based on its reliability and validity, as well as the presentation of limitations and biases within my data.

2.1 Philosophical Perspective

According to Saunders, Lewis and Thornhill (2016), research philosophy refers to systems of beliefs and assumptions about the development of knowledge which a researcher holds. For this paper, I adopted

a critical realism approach as a means of understanding and analysing my data and findings. Saunders, Lewis and Thornhill describe critical realism as focusing on explaining what we see and experience in terms of the underlying structures of reality that make up observable events (ibid). I chose this approach based on the content of my research, whereby I wanted to question the progress of cryptocurrency and the perception of this amongst people in the market. As such, I adhered to an objective ontological perspective combined with a social constructionist view, whereby I embrace realism and consider there to be an objective social world which is perceived and interpreted by the social actors within. As such, a critical realism perspective allows me to question and explore actors' assumption of the financial industry and their perception of its existence.

2.2 Research Approach

In order to appropriately explore my research question, I chose to adopt an abductive approach. This decision was based on the fact that I wanted to explore the financial industry post-cryptocurrency and identify any themes or patterns that could illuminate more clearly the impact of cryptocurrency technology in order to generate a description of the actual impact, which fulfils the definition of an abductive approach (Saunders, Lewis and Thornhill, 2016). This approach utilises a combination of both inductive and deductive approaches but invites a more iterative approach rather than simply moving from theory to data or data to theory as is the case with deductive and inductive approaches, respectively. I deemed this approach to be most appropriate given the emerging nature of this area, meaning there was less clear path for how to researching it. Within an abductive approach, known premises are used to generate testable conclusions and data is collected so as to explore areas and identify possible themes and patterns, and then locate these in a conceptual framework (Saunders, Lewis and Thornhill, 2016).

To complement this approach, I decided to pursue a qualitative strategy, defined as a research strategy which studies the interpretations of participants of the phenomenon being studied, and the relationship between them (Saunders, Lewis and Thornhill, 2016). It emphasises words rather than numbers in the collection and analysis of data (Bell, Bryman and Harley, 2019). That is to say, it

emphasises non-statistical data and is generally expressed through people's knowledge or opinions rather than through quantified information. I chose this approach because I believe it's advantages would complement the intention of my research as it focuses on descriptions and context, providing richer and broader information while still allowing significant flexibility in its structure. As Saunders, Lewis and Thornhill state, it provides grounds for researchers to make sense of "the subjective and socially constructed meanings expressed about the phenomenon" (2016).

2.3 Research Design

I decided to design my thesis as an exploratory study, based on the definition by Saunders, Lewis and Thornhill (2016) of an exploratory study being a useful approach to discover what is happening and gain insights about a particular topic, particularly through the use of open questions. Such a research design is advantageous for enhancing understanding of a phenomenon, which is exactly what I seek to do with my exploration of the impact of cryptocurrency on decentralisation in the financial industry. An exploratory research design also provides greater flexibility as it is relatively unstructured and compliments the iterative nature of abductive approach by relying the contributions of participants to help guide subsequent stages of research (ibid). Again, this is particularly advantageous for a new industry era that is not fully developed or emerged, such as the post-cryptocurrency financial industry, and where the research path is thus less clear. Further adhering to the exploratory research design, my research started with a broader focus, but narrowed down as I conducted interviews and developed greater clarity around my research focus.

Having chosen a qualitative research approach and exploratory design, I then chose a research strategy which fit both these approaches and my overall research question. According to Saunders, Lewis and Thornhill (2016) a research strategy is the plan for how the researcher intends to collect the data in order to answer the research question. It constitutes a framework for the collection and analysis of the research data (Bell, Bryman and Harley, 2019). I opted to utilise a case-study strategy, using the introduction of cryptocurrency to the financial industry as my case. A case study is "the detailed and intensive analysis of a single case" (Bell, Bryman and Harley, 2019). Additionally, the case study strategy

allows for the collection of data from multiple services, so long as it pertains to the specific situation being researched. Given the combination of many different industry players within the financial industry and resulting from the introduction of cryptocurrencies, this ability to source information from various sources and in different ways would serve to augment my research.

2.4 Research Methods

I interpret research methods as the means through which I collected and analysed my data. I conducted my data collection through primary and secondary sources, making my data collection a multi-method qualitative process (Saunders, Lewis and Thornhill, 2016). My primary data comes from semi-structured interviews and I gather and analyse secondary data from sources such as company research articles, online articles and research books on the topic.

2.4.1 Primary Data

As stated above, my primary data was collected through semi-structured interviews which were a mix of face-to-face and telephone interviews. An interview is defined as a purposeful interaction between two or more people (Saunders, Lewis and Thornhill, 2016). My interviews were focused more on learning and understanding my interviewee's opinion on the topic of my research, as is typical with qualitative interviews (Bell, Bryman and Harley, 2019). As my aim was to understand the perspectives and opinions from different players within different areas of the financial area, I chose to adopt a semi-structured approach as opposed to set and standardised questions that wouldn't allow for flexibility to adapt during the course of the conversation. A semi-structured interview can be understood as non-standardised, using sets of prepared questions that were tailored to interviewees to guide the interaction, but also introducing new questions, topics and follow up questions throughout the interviews as the conversations evolved (Saunders, Lewis and Thornhill, 2016).

The purpose of these interviews was to ascertain the opinions and perspectives of industry experts, both from the traditional financial industry and the cryptocurrency industry. The interviews served as a means to build an understanding of the present situation of the financial industry, and industry

experts' descriptions of the previous situation and ways in which cryptocurrency was attempting to infiltrate the financial industry. My choice of interviewees was thus guided by finding those who were involved in the financial industry in some form and who were relatively knowledgeable of how the system worked and the changes being introduced. As such, I drew from a pool of experts who worked in the cryptocurrency sphere, such as from Chainalysis, Bitcoin Suisse and several cryptocurrency coins, and those who worked in the more traditional sphere such as from Danske Bank. These interviewees hold various roles, from more junior roles such as analyst to the top of the ladder as CEOs and Co-Founders. My choice of interviewees was also largely determined by access to potential interviewees, which proved more difficult to obtain for those within the traditional financial industry sphere. Recognising this imbalance of perspectives in my data collection, I attempt to address this through my secondary data sources.

In total, I conducted 10 interviews over the course of 6 weeks, starting from end of January 2020 to the end of February 2020. In the table below, I have listed my interviewees, their company and position within the company. It is important to note that while my interviewees all work within different companies, the insights they provide, excluding those of the CEOs and Founders, represent only their own personal opinions and do not represent the opinions of their companies.

Interviewee	Company	Position	Company Type	Interview Type
George Coxon	Nano	Chief Operating Officer	Coin	Phone
Colin LeMahieu	Nano	Founder	Coin	Phone
Jan Meyer	Dash	CEO	Coin	Phone
Anon 1	*Anonymous*	*Anonymised*	Coin	Phone
Gustav Arentoft	MakerDAO	Business Development Representative	Coin	Face-to-face
Lidia Mereacre	Monolith	Business Development Representative	Decentralised Bank	Phone

Mikael Bondum	Bitcoin Suisse	Product Owner	Cryptocurrency Financial Service Provider	Face-to-face
Anon 2	Chainalysis	*Anonymised*	Cryptocurrency Risk Analysis	Phone
Mads Clemmensen	Danske Bank	Lead Blockchain specialist	Bank	Fact-to-face
Rachel Maher	Deloitte	Consultant at Blockchain Lab	Management Consultants	Phone

Table 1: List of interviewees with information about their positions, companies and interview method

Interviews were between 30-55min long and were guided by pre-prepared sets of questions which have been appended (see Appendix 1), but given their semi-structured nature involved unique questions for each interviewee. This enabled me to glean the most insightful data from interviewees. Every interview was recorded on my phone and/or on my laptop, and later transcribed using an online, AI powered free transcription service. Transcripts were reviewed and corrected after processing by this service to ensure accuracy.

2.4.2 Secondary Data

According to Saunders, Lewis and Thornhill (2016), secondary data refers to further analyses of data that was collected, typically by other sources and for purposes other than the specific topic being researched and can include raw data and published sources. I made use of this data type in order to address the imbalance of perspectives in my primary data, but also to further augment my research and the interpretations and conclusions I draw from it. This proved significantly less challenging to gather, as given the hype surrounding cryptocurrencies and their potential impact, much has been written on the subject from actors across all areas of the financial industry. As part of my secondary data collection, I made use of online articles from official sources, such as UBS, Accenture, Deutsche Bank and Citi Group, and less official sources written by informal subject experts, such as articles from Hackernoon. Given the emerging nature of the cryptocurrency field, many experts in the area fit in this

more “informal” field, and thus I deemed it prudent to make use of such sources, while still taking precautions to check the quality of the information presented.

2.5 Data Analysis

In order to analyse the data I collected, I engaged in thematic analysis. This involved searching for themes and/or patterns within the data collected, and then coding the data accordingly (Saunders, Lewis and Thornhill, 2016). Coding the data is the process of labelling segments of data from each data source with a code that summarises the relevance of the extract (ibid). For this I used the approach of Charmaz (Charmaz cited in Saunders, Lewis and Thornhill, 2016) of initial coding followed by focused coding (Saunders, Lewis and Thornhill, 2016). While codes can be derived from different sources, I developed mine based on what I felt was the best descriptor of the data based on my knowledge and understanding of theory, making them a mix of a priori codes and novel codes. From doing this, I identified the following initial codes:

Code	Description
Decentralisation	*Any data relating to the need for decentralisation, the link to cryptocurrency and the support of cryptocurrency fans for decentralisation, as well as critiques of it.*
Perspective of Incumbents	*Any data that pertained to the (potential) perspective of incumbents on cryptocurrency*
Case for Cryptocurrency	*Any data which highlighted the selling points of cryptocurrency*
Cryptocurrency’s Journey	*Any data elaborating on cryptocurrency’s journey to its current position, and the strategy it is currently employing*
Future of Cryptocurrency	*Any data relating to expectations or predictions for cryptocurrency’s future*
Critiques/Obstacles for Cryptocurrency	*Any data which highlighted critiques of cryptocurrency*

Table 2: Initial Coding

Following this, I engaged in focused coding which is the process of creating sub codes within the initial codes, which can then be used to detect specific patterns to develop the analytical and explanatory focus of the coded data (Saunders, Lewis and Thornhill, 2016). As a result, I came up with the following subset of codes.

Focused Code	**Description**
Decentralisation_Link	*Any data that explained the link between decentralisation and cryptocurrency*
Decentralisation_Need	*Any data explaining the perceived need/argument for decentralisation*
Decentralisation_Support	*Any data showing that cryptocurrency supporters support decentralisation*
Future_Incumbents	*Data discussing the potential future roles of incumbents in the financial industry*
Future_Vision	*Any data describing predictions and expectations for how the financial industry will look*
Future_Cryptocurrency	*Data discussing the potential future roles of cryptocurrency in the financial industry*
Journey_Evolution	*Any data relating to the cryptocurrency's evolution and path to its current position, as well as descriptions of its current position*
Journey_Strategy	*Any data elaborating on the strategy cryptocurrency is pursuing to further their adoption*
Obstacles_Psychology	*Any data pertaining to the psychological barriers for cryptocurrency adoption*
Obstacles_Infrastructure	*Any data highlighting the infrastructural obstacles cryptocurrency must overcome*
Obstacles_Regulation	*Any data explaining the regulatory obstacles facing cryptocurrency*
Obstacles_Critiques	*Any data explaining the critiques of cryptocurrency*

Table 3: Focused Coding

2.6 Limitations and Biases

While I tried to eliminate any biases and suboptimal situations as much as possible, no research situation can ever be 100% free from either. As such, I will use this section to address those which I identify could be present in my research. First, while I believe I have chosen a methodology design and process that is best suited for this research topic, it is possible that my choices have obscured some findings that other approaches would uncover leading to different outcomes. Taking this into consideration, I have attempted to continuously find the most suitable option as per my own understanding.

Secondly, the time period set for this thesis limits all research and analysis to an approximately 6-month period. While more time could undoubtedly have led to further research which may have yielded extra findings of relevance, I believe that I did as much as was possible given the time available to me. An added factor of the time limitation worth mentioning is the corona virus. The medical pandemic during the time of writing this thesis impacted the access I had to many potential interviewees, as many people were only willing to meet at their offices and had their availability significantly disrupted, making additional interviews extremely hard to do with the corona pandemic from March onwards. As a result, if I had more time, I potentially could have more interviews and extra insights, but I still believe that given the circumstances and thanks to technology, I made the best out of the situation and mitigated the impact on my research as much as possible.

Thirdly, as I have already highlighted, the majority of my interviews were with those who were primarily of the pro-cryptocurrency mindset due to the difficulties in securing interviews with those from the more traditional side of the financial industry. This may have caused my resulting insights to be somewhat skewed in favour of finding that cryptocurrencies have been successful in progressing decentralisation. However, I am aware of this and, as also mentioned above, have attempted to address this imbalance as much as possible with secondary data sources which favour the alternative argument. As such, I believe I have been able to collect a well-rounded wealth of data which has led me to relatively unbiased findings.

2.7 Research Quality

Bell, Bryman and Harley (2019) identify three defining factors of research quality. These are reliability, replicability and validity. Reliability refers to whether the results of the study are repeatable (ibid). Through outlining my approach to gathering data and my interview process as well as the questions used, I believe the results of my study could be repeated. Replicability is very similar, referring to the ability for my study to be replicated (ibid). Again, having detailed my methodological approach, I believe my study could be replicated relatively easily. Lastly, validity refers to the integrity of the conclusions generated from my research (ibid). I have taken great care to ensure the validity and reliability of my sources by only using information from known, reliable sources and from those who are deemed to be experts in their field. By carefully outlining the logics of all conclusions within this paper, I believe I have also strengthened the trustworthiness and believability of my conclusions. As such, I believe my research to be of an acceptably sound quality.

CHAPTER 3: LITERATURE REVIEW

Within this paper, I argue that cryptocurrency promotes decentralization in the financial industry by altering key financial institutions. In order to make this argument I will first summarise the ideologies behind cryptocurrency's campaign to disrupt the financial industry. It also requires summarizing institutional theory as a means of outlining how to evoke change in an industry as established as the financial industry. I propose that this change is facilitated through institutional change, and as such will further summarise theories of how to effect change at the institutional level, whereby I will outline sociotechnical theory, robust action strategy, proto-institutional theory and theories of legitimacy. I will use this literature collectively to outline how perspectives and interactions can be altered by the introduction of cryptocurrencies, ultimately creating the opportunity for the overhaul of the current financial system.

3.1 Theories of Cryptocurrency

Given the relative novelty of the concept of cryptocurrency, literature on the topic is thus far more descriptive than exploratory in nature. As such, my outline of the literature below largely presents

descriptive findings of the nature and reasons for the emergence and progress of cryptocurrency, rather than being more theoretically based.

3.1.1 Arguments Promoting the Need for Cryptocurrency

Arguments for cryptocurrency are multi-faceted, including the assertions that centralisation is an outdated and ineffective approach for the financial industry, that payment intermediaries and third parties in general are a negative presence in the financial world and lastly, that state currencies pose a growing threat to the financial control and privacy of individuals. These arguments for cryptocurrency can be categorised into two main schools of thought as to the transformation cryptocurrency can bring to the financial industry. The first of which is digital mutualism, a school of thought which has been identified and acknowledged by several scholars (Maurer, Nelms and Swartz, 2013, Swartz, 2018) and largely focuses on reducing centralisation so as to give consumers greater financial control. Swartz then extends this with the identification of a second school of thought, which she labels infrastructural mutualism (2018) and which focuses on reducing centralisation for improved infrastructure and the removal of unnecessary, expensive middlemen. Below, I will first discuss each facet of the argument for cryptocurrency, before elaborating on the resulting schools of thought for the transformation which cryptocurrency can enact on the financial industry.

3.1.1.1 Inefficiencies of Centralisation

As stated by Swan (2015), “centralization was a good idea at the time”, with Atzori (2015) explaining that it was introduced as a means of reaching consensus at a time when there was no viable way to do so at scale. In particular, Batlin et al explain that centralisation was introduced to the financial system as a means of protecting consumers’ finances while making transactions, through the introduction of trusted intermediaries such as banks (2016). However, many proponents of cryptocurrencies argue that this need for centralisation within the financial industry is no longer present (Swan, 2015, Atzori, 2015, Qureshi, 2018). Swan argues that this can be explained by the evolution and development of technology such as the internet and blockchain which has made reaching consensus possible at a global scale and allowing larger-scale, more complicated coordination (2015). These technological developments have

therefore made redundant the main purpose of a centralised approach. Furthermore, Atzori (2015) argues that not only is centralisation no longer needed, but that it presents weaknesses within the system. He argues that centralised authority can be defined as a Single Point of Failure, as if it doesn't function optimally, it negatively affects the whole system and all participants within (ibid).

A primary cause for the suboptimal functioning of a centralized authority can be inferred to be agency problems; the inherent flaw in placing decision making power in the hands of human agents. While agency problems as a flaw of centralisation was not specifically mentioned by any authors within the scope of this literature review, it was indirectly referenced by several sources. Maurer, Nelms and Swartz (2013) identified that cryptocurrency was established to counter the surveillance power of incumbents, suggesting that these companies' greed for profit was beginning to blind them to their infringements of their consumers' privacy. These authors and Atzori (2015) also identified having to place trust in others to best serve the needs of customers as problematic, arguing this trust was being abused to the advantage of others through fees and monetization of consumers data. Reid and Templeman also conceded that a key problem of the centralized system is that it is always too tempting and too easy for actors to act in their own best interests and not in the interests of their customers, such as by simply creating money as desired (2019). Collectively, these critiques can be interpreted as non-specific descriptions of agency problems, whereby agents operating within a hierarchical, centralized authority cannot always be trusted to not act with their own best interests in mind (Van Horne, 1995). Ultimately, the brunt of the flaws of a centralised system can be determined to fall under the umbrella description of agency problems, where the greed of agents acting as trusted intermediaries can lead to increased risks of the overall financial system becoming a single point of failure, as illustrated by the 2008 recession.

3.1.1.2 Flow Capitalism and Seignorage

Maurer, Nelms and Swartz (2013) further argue that the existence of excessive profiting of intermediaries such as banks, governments and payment services through flow capitalism and seignorage substantiate the need for decentralisation within the financial industry. They define flow

capitalism as profiting from the movement of money by those with a monopoly on transactions (ibid, 2013), such as the charging of fees by players like PayPal for transferring your money to another bank account. Many within the cryptocurrency sphere argue that individuals should have the right to freely move their own assets as they see fit without being required to utilize and pay for third party services to do so (Swartz, 2018). Maurer, Nelms and Swartz (2013) therefore argue that cryptocurrency offers a means to end the practice of flow capitalism thanks to its capacity to simultaneously act as a store of value and offer transferring capabilities, and therefore removes the need for third party intermediaries.

Seignorage on the other hand refers to the difference between the value of money and the cost for the government to produce and then distribute it (Huber, Hays and Valek, 2019). This provides governments and bank with a huge source of income which they have become accustomed to and dependent upon. However, the authours argue that this is an unfair fee to charge given that governments and banks mandate that they must be the ones to mint money and then also dictate that seignorage be a part of the process (Huber, Hays and Valek, 2019). They therefore advocate for a monetary system that doesn't incorporate this as part of the process (ibid). The authors claim that stateless currencies, such as any cryptocurrency, would fulfil this requirement, eradicating this source of funds for governments (Huber, Hays and Valek, 2019).

3.1.1.3 Financial Control

Several authors argue, based on the arguments of John Locke, that the value of money lies in the imaginary value that humans consent to bestow upon precious metals and as such, money should operate independently of state authority and be free from the arbitrary power of government (Qureshi, 2018, Maurer, Nelms and Swartz, 2013). Qureshi elaborates on this point, highlighting that economic mismanagement by governments is a problem that has resulted in hyperinflation in 50 nations in the last century. Atzori further adds to this by outlining that the economic policy in the current system is heavily influenced and often decided upon by political and state government bodies (2015), who are potentially subject to the aforementioned agency problems. These authors thus propose that

cryptocurrency, and the greater decentralisation it brings, are needed to provide consumers with greater financial control as a means to combat this flaw of the centralised system.

Maurer, Nelms and Swartz also draw attention to the additional element of financial control which is the right to privacy (2013). They outline how excessive surveillance on the behalf of governments, banks and even businesses, has emerged from the digitalisation of the monetary system (ibid). According to the authors, this is a result of the increase in social media business models, which encouraged the monetization of consumer data (ibid). According to Swartz (2018), critics of this monetization of consumers' data propose a system which can offer the traceability required for regulatory security but also the privacy to still remain relatively anonymous, such as is offered by cash. With cryptocurrencies, just like with cash, the identities of the payer and payee can remain unknown to each other and to the public (ibid). This puts a stop to the surveillance practices of governments and banks of individuals' finances, which exceeds the necessary regulatory responsibilities of both and which many see as overly intrusive.

3.1.2 Cryptocurrency as a Solution

"No one would deny that the current system is also frighteningly complex, highly redundant and very expensive" (Batlin et al, 2016)

The combination of the decreasing need for a centralized model, growing dissatisfaction with flow capitalism and increasing demand for greater financial control forms the basis of the argument for the need for an alternative to the current centralised system. Several sources claim that cryptocurrencies can and should be this alternative. Qureshi claims that cryptocurrencies currently provide the only serious competition to the current system (2018) based on their offering of a system that addresses all of the above-mentioned problems through technology (Maurer, Nelms and Swartz 2013). Nikolov (2018) describes cryptocurrency as presenting an apolitical alternative financial system that gives consumers a legitimate alternative to staying in the current system. There are two main schools of

thought as to how this alternative financial system would evolve, which Swartz has labelled Digital Metallism and Infrastructural Mutualism (2018).

Those in the Digital Metallism camp embrace the theory of money which states that money must be backed by a commodity like gold and view cryptocurrency as an alternative version of money (Nikolov, 2018, Swartz, 2018). They emphasise the importance of commodity-backing for money so as to mitigate the potential for whimsical manipulation by financial and state actors (Swartz, 2018). For Digital Metallists, cryptocurrency poses the opportunity for a new means of storing value that could and, even should, replace current currencies due to being a sounder, and thus superior, form of money than current forms. They then focus on increasing cryptocurrency's use as means of payment.

Infrastructural Mutualism extends this argument, by also seeing the potential for cryptocurrency to serve as an alternative to contemporary banking (Nikolov, 2018, Swartz, 2018). Those within this camp recognize the potential for the technology of cryptocurrencies to eliminate the need for many of the intermediaries present in the current system. For infrastructural mutualists, this is important because they see intermediaries as just interfering third parties who profit from the mandating of use of their services. They strongly object to this based on their belief that information should be free to move unhindered by third-party interference, control, surveillance and profiteering, and argue that money is just another form of information (Swartz, 2018). For the purposes of this paper, I will primarily assess the impact of cryptocurrencies from an infrastructural mutualism perspective by assessing the extent to which cryptocurrencies are progressing an alternative banking and financial system which is more decentralized. This is based on cryptocurrency's ability to potentially replace and thus reduce the number of players within the industry, including intermediaries, and fulfil their roles through technology instead. In conclusion, cryptocurrency theories point to a growing need for an alternative to the current financial system which they argue is failing, and that this alternative should be premised on greater decentralization. However, despite being heralded as the best solution to these problems, the extent to which cryptocurrency can successfully infiltrate the current financial system and thus

promote a more decentralized approach is yet to be determined. I therefore intend to use these and the following theories to assess cryptocurrency's success in this endeavour.

3.2 Institutional Theory

In order to discuss institutions and how cryptocurrencies are impacting them, it is first important to understand why they are relevant for assessing how and whether cryptocurrency contributes to an increase of decentralisation within the financial industry. Their relevance is based on the identification of the financial industry as a field, based on Battani's definition of fields "as a collective definition of a set of organisations as an industry, of formal and informal networks linking such organisations, and of organisations committed to supporting, policing, or setting policy toward the industry" (p. 606, 1999). This is important because fields are built on groups of organisations developing common understandings and practices, known as institutions (Battani, 1999), and therefore institutions are arguably the fundamental components of any industry, including the financial industry. As the fundamental components, it can logically be assumed that changes to an industry would stem from institutions, which is the foundation for my hypotheses that any changes implemented by cryptocurrencies would be conducted through the financial industry's institutions.

Authors suggest multiple different definitions of institutions. Lawrence proposes that institutions are patterns of practice whereby departures from the pattern are countered in a regulated fashion, by repetitively activated, socially constructed controls which take the form of some set of rewards or sanctions (2008). Alternatively, North offers the definition that institutions are humanly devised constraints that structure political, economic and social interaction (1991). I find that Lawrence's definition focuses too much on the constraining activity of institutions, while North's definition falls short of a full description. As such, for the purposes of this paper I instead rely on the definition offered by Lawrence, Hardy and Phillips (2002), which defines institutions as the widely diffused practices, technologies or rules which shape human interaction within a field. They shape behaviour by constituting the set of acceptable interpretations and actions available to actors within them (Hargadon and Douglas, 2001). They can utilise informal constraints such as sanctions, taboos, customs, traditions,

and codes of conduct, as well as formal rules such as laws (North, 1991). Those specific features that bind a field together and govern the field interactions are known as institutional infrastructure and make up the basic physical and organisational structure and facilities needed for the operation of a society (Hinings, Logue and Zietsma, 2017). They are the "cultural, structural and relational elements that generate the normative, cognitive and regulative forces" (p. 170, ibid). The main elements are collective interest organisations, regulators, informal governance bodies, field-configuring events, status differentiators, organisational templates and categories or labels (Hinings, Logue and Zietsma, 2017).

Furthermore, Hinings, Gegenhuber and Greenwood (2018) argue that organisations can only be understood by taking account of the influence of their institutional context. Based on Stevens' (1994) definition of decentralisation as the process whereby organisations transfer power from the centre to sub-units, examining the extent to which there has been an increase of decentralisation within the financial industry requires looking at the organisations within this industry. Thus, it is vital to be able to understand the organisations and their actions, which as Hinings, Gegenhuber and Greenwood argue, can only be done with a good understanding of the institutions they adhere to (2018). As such, institutional theory is important for understanding the many components that make up the financial industry, while also allowing for understanding of the organisations within by providing a way to interpret their actions through the context in which they are enacted.

As my argument centres on the proposition that cryptocurrency contributes to increasing decentralisation by altering the institutions that make it possible for the industry to function, it is also important to explore how institutions can be changed and equally, how changing institutions results in greater change, which I will do in the following section.

3.2.1 Changing Institutions

Changing institutions is no small task and attempts to do so are frequently met with resistance, and so they typically evolve incrementally. According to North, institutions instigate change by connecting the

past with the present and the future, with the resulting consequence that history is largely a result of institutional evolution (1991). In order to demonstrate how cryptocurrencies are changing the institutions of the financial industry, it is necessary to first explain how institutions can be changed and how small changes to institutions can result in larger, transformational change that is industry wide. To do this, I will refer to Hargadon and Douglas' argument about institutions and innovation to first discuss how change should be introduced within an institution (2001). Building on this, I will then draw on Berg and Berg's work identifying a new strategy for enacting change within institutions (2017). Lastly, I will use Lawrence, Hardy and Phillips (2002) work on proto-institutions to outline how minor institutional changes gradually evolve into larger institutional changes. Combined these theories provide a frame to understand how cryptocurrencies could push change within the financial industry.

In their 2001 article, Hargadon and Douglas explore the tactics by which innovations can displace existing institutions and suggest how innovations can exploit such tactics. They do this by presenting evidence that Edison triumphed over the gas industries with electric light not by merely presenting a superior technology, but by initially cloaking this new innovation under the guise of the established institutions that surrounded the monopolistic success of the gas industries. They argue that a key factor of an innovation's value is how well individuals and organisations comprehend what the new idea is and how to respond to it, but that potential adopters will interpret the details of an innovation based on their past understandings and experience, rather than objective details of the innovation. Therefore, Hargadon and Douglas argue that to successfully introduce an innovation, innovators must present their new innovation in a manner that potential adopters can understand given their knowledge and understandings, but that also signifies that there is a significantly advantageous difference in using their innovation over incumbent technology. They label this approach a robust action strategy (2001).

The concept of robust actions is based on Leifer's study of chess masters (Leifer, cited in Hargadon and Douglas, 2001) which revealed that players chose chess moves that would advance a particular strategic objective while still providing the flexibility to respond to opponents' actions. Applied to innovations, Hargadon and Douglas propose that robust actions involve arranging the concrete details so they can

be located within the familiar world of the current institution, while still allowing for future evolution by not constraining the potential evolution of understanding and action that follows use (Hargadon and Douglas, 2001). Accordingly, innovators should initially present the meaning and value of their innovations in the language of existing institutions by giving them the appearance of familiar ideas, which can involve adopting approaches that utilise familiar features, present others as new and keep others hidden from view. In essence, successful institutional innovation requires innovators to locate their ideas within the present set of understandings and patterns of action that make up the institutional environment they are present in to gain initial acceptance, while simultaneously retaining the inherent differences of the new technology so as to actually progress change within the institution.

Hargadon and Douglas illustrate this argument effectively through the case of Edison and his introduction of electric light to a market dominated by gas companies. At the time of Edison's introduction of electric light, the gas industry was heavily interwoven into the city's physical and institutional environment, and deep into all aspects of the institutional infrastructure thanks to their gas mains that were buried underground, extensive corps of city-employed lamplighters and powerful influence over political actors. Edison met fierce resistance from incumbent players and Hargadon and Douglas as such identify two forms of institutional resistance to change. One form is through normative and regulatory means, such as the New York mayor's outright refusal to grant Edison's company an operating franchise. The second form is through the provision of the very understandings, interests, and actions of actors that constitute behaviour, whereby many opposers claimed what Edison was trying to achieve was simply not possible. This resistance was incited by Edison's promotion of the technology as distinguishable from current technology by consistently claiming it was a superior product and cheaper.

However, this was the only act of distinguishing that Edison engaged in, as he actively pursued a strategy "to effect exact imitation of all done by gas" (p.489 Edison, cited in Hargadon and Douglas, 2001). He did this, for example, by exploiting elements of existing gas systems and mimicking their approach to market and by choosing to initially generate and distribute electricity in the same

centralised manner as gas companies, despite there being better approaches. He also ensured that the brightness of the electric lights installed was kept at a similarly low level as gas lights, despite having the capacity to be brighter. He even insisted on billing for electric systems to be done based on meters, just like with utilities, despite there being no established way to measure electricity consumption at the time, meaning that early adopters of his system received free electricity. By doing this, Edison made use of skeumorphs, which are elements of design that serve no objective functional purpose but are important for the public's understanding of the relationships between innovations and the objects they displace (Hargadon and Douglas, 2001). By combining his approach of distinguishing his product through promotion of this innovation as cheaper and superior with his strategy of imitation, Edison enacted a robust action strategy which enabled him to infiltrate the dominating gas industry and eventually displace the preceding institutions in favour of his new system and accompanying institutions.

Supporting Hargadon and Douglas' proposition of how to introduce innovation to existing institutions, Berg and Berg propose the strategy of Forking as a means to introduce change (2017). Berg and Berg extend Hirschman's original proposal that exit and voice are the two ways consumers can exert power over firms by proposing a third option which they label 'forking'. Where exiting involves refusing to do business with firms or migrate to a different jurisdiction, and voice involves voting, protesting or complaining, forking is instead a form of group secession, with origins in the open-software community, that takes an existing set of institutions and creates a new society with a shared history but divergent futures (Berg and Berg, 2017). Rather than proposing entire alternatives for consumers who are dissatisfied with the current institution, forking allows groups to inherit the institutions of the originating society, and alter them as they see fit, even abandoning elements they no longer deem relevant or appropriate. This is in line with North's original explanation of the incremental evolution of institutions, connecting the past with the present and the future (North, 1991). The authors base this theory on evolutionary entropy, which states that two separate but otherwise identical populations will diverge over time because entrepreneurs will develop new ideas. Because of the slightly differing institutional setups, these ideas will then be uniquely adopted by each population.

Lastly, Lawrence, Hardy and Phillips (2002) offer an explanation for how new institutions which may be accepted by some groups within a field, potentially thanks to robust actions, can eventually evolve to be the dominant institution. The authors argue that collaboration acts as a source of change in institutional fields by creating proto-institutions, which are new institutions borne within a collaboration that subsequently outlive the collaborative partnership. As such, they can arguably also be defined as those institutions which are not quite fully fledged, but which are still present within a field, and most likely exist in contrast to the dominant institution, representing the final stage before a new institution overthrows an incumbent institution. Lawrence, Hardy and Phillips propose that proto-institutions come into existence via a multi-stage process which first involves a collaborative partnership which rules and/or technologies arise from, although these are not institutional effects (2002). If these rules, technologies and/or practices diffuse beyond the collaboration, whereby either or both organisations engage with them outside of the scope of the collaboration, they can be deemed to be proto-institutions (ibid). Lastly, if these proto-institutions are then further adopted by other organisations, they become institutions. Within the financial industry, proto-institutions could emerge through collaborations with cryptocurrency companies, establishing proto-institutions, which can eventually further diffuse across the financial industry establishing precedent for the new institution.

3.2.2 Achieving Legitimacy

While not a direct product of institutional theory, I will also include here a section on legitimacy theory. I do this because achieving legitimacy is an important element of establishing new institutions, as without the social acceptance of legitimacy, an institution is merely an attempt to create an institution. As outlined by Zimmerman and Zeitz (2002), legitimacy is defined as the social judgement of acceptance, appropriateness and desirability. Most importantly, according to the authors, it can help overcome the "liability of newness" (ibid), which is of course vital for the creation and establishing of new institutions. Its value offering lies in the bounded rationality of most consumers, who generally don't have the time and/or capacity to process all the necessary information needed to make a decision about whether something is good or not. Instead, if something has been deemed to be legitimate in

the eyes of the social system the consumer exists in, then they can assume that it is good, rather than have to commit mental and temporal resources to assess this themselves. Legitimacy comes in three forms; sociopolitical regulatory, sociopolitical normative and cognitive. Sociopolitical regulatory legitimacy refers to legitimacy obtained from regulations, rules, standards and expectations created by governments and can be earned by adhering to laws and regulations and registering with relevant authorities, for example (ibid). Sociopolitical normative legitimacy refers to deriving legitimacy from the norms and values of society and can be earned by demonstrating adherence to these (ibid). Lastly, cognitive legitimacy refers to legitimacy earned by conforming to the rules of the social system that the object is housed within (ibid). Zimmerman and Zeitz also propose that entire industries can offer legitimacy if an organization uses the industry's standards, norms, practices and technology (2002).

Furthermore, Zimmerman and Zeitz propose that strategic choices can be made by organisations to influence the type and level of legitimacy they earn, which they label as a strategic legitimation approach (2002). Within this approach, they identify four strategies to achieve legitimacy which can be used "in any combination, concurrently or sequentially" (ibid). The first is conformance which involves seeking legitimacy by conforming with the existing social structure in which the organization is positioned (ibid). Selection involves some element of conforming, but involves the organization selectively choosing their location to be in a favourable environment (ibid). Manipulation involves changing the environment the organization is in to create the conformity needed for legitimacy (ibid). Lastly, creation involves creating the basis of legitimacy for particularly new and innovative industries and organisations (ibid). No matter the strategy employed or how, Zimmerman and Zeitz state that there is always a threshold of legitimacy which needs to be met in order for an institution or organization to be successful and survive (2002).

I draw on these elements of institutional theory to argue that cryptocurrency is enacting change within the financial industry by altering its institutions. Institutional theory provides a lens through which to understand the financial industry's institutions, and to also understand how a transformational change, such as progression toward a decentralised model of finance, can occur by providing arguments on how

changes occur within institutions and how these changes gradually diffuse to become large industry transformations. This therefore serves as a checklist of sorts by outlining what should be present for there to be evidence of institutional change.

3.3 Sociotechnical Theory

While arguing that cryptocurrencies will change the industry by changing the institutions, it is important to also clarify how a technology can influence change. To do this, I will use sociotechnical theory. Sociotechnical theory maintains that technologies can have strong influence on the roles and activities present in the environment they are introduced, altering or even removing them, as well as causing the introduction of new actors and activities to be performed.

Technology has typically been seen solely as a means to an end, or a tool to be used by actors. However, sociotechnical theory argues that this perspective is lacking, failing to take account of the role technology can play in constructing the environment, and arguably institutions, around them. According to Tryggested (2005), technology should no longer be seen solely as a tool to be used, but rather technology can also transform ends and even become actor in its own right. Swartz argues just this, stating that money is a technological arrangement which affects interactions between it, individuals, society, the state and the economy (2018). She extends this by arguing that money then plays a significant role in enacting social order within the financial industry (ibid). Adding to this argument, sociotechnical theory calls into question the concept that one institution sequentially replaces another, proposing instead that institutions are gradually built and transition slowly into a new institution, rather than through deliberate changes from one to the other. This is described as a performative perspective, whereby an institution is defined through practice as actors work together with materials and associated technologies (Tryggested, 2005). As Tryggested succinctly puts it, “it is not a given order, but an achieved order” (2005, p.43), referring to institutions being the result of many interactions and objectives of actors, rather than pre-determined concepts which are deliberately built and then implemented. This highlights how the financial industry, despite its perception as a fully

established industry with cemented institutions, is also just a set of actors, roles, technologies and their interactions, which are open to redefining, potentially to a decentralised industry.

This is best explained by Latour (1990), who argues that the interpretations of actors and their interactions with technology is not granted, and instead can be moulded and transformed. In this sense, he argues that technology can be used to shape the environment to enforce specific interactions and interpretations (ibid). As actors gradually enrol to these designed environments and required sets of behaviour, there is a gradual transformation in roles and identifications (ibid). This is well illustrated through duGay's article on the introduction of self-service to the British retail market after World War 2 (2007). In his article, duGay describes how the introduction of self-service technology caused a drastic change of interactions between the main actors within the industry and caused a redefining and reconstructing of their roles. It also necessitated changes to and the introduction of new technologies, such as new payment methods and the physical redesign of stores to help guide customers unaccustomed to wandering stores without assistance from store employees. In essence, self-service's introduction created an entire new consumer identity through the combination of interactions between new and old technologies with new and old actors across the industry, despite having only been intended to be an effective cost-cutting measure for merchants. Ultimately, this new approach created entire new institutions which reshaped the British retail industry. It is my hypothesis that a similar effect can be detected within the financial industry based on the introduction of cryptocurrency, and that these effects are what have contributed to greater decentralisation.

I will draw on sociotechnical theory to analyse how the cryptocurrency technology itself promotes decentralisation within the financial industry and how it impacts on different elements of the institutional infrastructure, from the roles of actors to their interpretations and behaviour. Sociotechnical theory therefore provides a means to analyse and understand the specific role of the technology, outside of the influence of the human actors who are promoting it.

CHAPTER 4: FINDINGS

In the following section I intend to present the findings from my data collection through primary and secondary data sources. My findings can be categorized into four sections; decentralization, current situation, predictions for the future and cryptocurrency's strategy. Within the 'decentralization' section, I will outline my findings in regards decentralization being a necessary element of cryptocurrency technology's introduction and how it is built into cryptocurrency technology. This section thus provides evidence of the link between cryptocurrency technology and decentralization to support my hypothesis that cryptocurrency technology could introduce further decentralization into the financial industry. However, within this section I will also introduce my findings of different views of the decentralization that various actors within the financial industry envision. In the next section, 'current situation', I will detail my findings of the perspectives of various actors within the industry of the current status of cryptocurrency and the impact it is having at present. Following this, within the 'predictions for the future' section I will outline the predictions of how the finance industry is expected to look in the future as a result of the introduction of cryptocurrency technology, and the extent to which there will be more or less decentralization. Lastly, in the 'cryptocurrency's strategy' section I detail my findings of how the strategies which appear to be being employed to establish cryptocurrency are furthering decentralisation's infiltration to the industry.

4.1 Decentralisation

"Decentralisation is fundamentally important to why cryptocurrency exists, and that's the foundation to all of this"

- *Anonymous*

In order to answer my research question, it is important to verify cryptocurrency's connection to decentralization. Through my interviews and secondary data analysis it became very apparent that the direct connection between cryptocurrency technology and decentralization stems from proponents of cryptocurrency's staunch belief in the superiority of decentralization over centralization. This has led them to create and develop technology, in the form of cryptocurrency, which answers the problems of

centralization that they identify, by having decentralization built into its very structure. I will now summarise my findings in regards the belief for the need of decentralization and then how it is built into cryptocurrency.

As discussed in the literature review, cryptocurrency is founded on the belief that centralisation is no longer effectively serving consumers based on the many issues identified by cryptocurrency proponents. Cryptocurrency supporting interviewees generally agreed with the sentiment that the present centralised system is problematic, with some going as far as to say it's not working. In a recent report, UBS conceded that the current system is overly complex, redundant and expensive (Batlin et al, 2016). Lidia reinforced this with her statement that "what we currently have is not actually working" pointing to the financial crisis of 2008 as an illustration of this. She reasoned that the system problems that caused this crisis persist, because "banks and governments are just tackling the symptoms and are not tackling the problem", inferring, of course, that centralization is the problem being left untreated. Thus, like many other interviewees, she felt that decentralization was necessary to revolutionize and improve the offerings of the financial industry, and that until further decentralization was introduced, no number of new product offerings would suffice. Thus, cryptocurrency proponents feel that the value offering of cryptocurrency lies in the market's apparent need for decentralization, and this is the main reason for their creation, proving the technology stems from proponents' belief in and desire for decentralization.

Corroborating this, many of my interviewees drew attention to some of the critiques of centralization as a means of explaining the introduction of cryptocurrency. They felt that cryptocurrency's potential to decentralize the monetary system was the solution to the problems of the centralized industry. This is because, despite a variety of criticisms of centralization being identified within the cryptocurrency literature, the critiques of interviewees mostly focused on the agency problems associated with centralisation which they felt cryptocurrency would address. For example, Gustav highlighted how power over the monetary system lay in the hands of a few and that "a few companies sit on the entirety

of the world" and Rachel also added that she felt "we could move to more decentralisation and having power more spread out". Jan explained why this was important by saying:

"I think that decentralization is necessary to offer a product that can outperform the existing system. You can only reach a goal like this when you do it in a decentralized way, because otherwise you will have power in one institution with some people. And as soon as you give power to a small group of people they will use this power and maybe not for the benefit of all the others, but for their own benefit because they have the power. And this is also proven by history, what happens all the time "

With the current system, a "bureaucrat in Strasbourg or so is basically controlling your purchasing power, your salary and taxes and you can't do anything about it" (Mikael, Interview). Clearly, cryptocurrency proponents propose that decentralization presents a superior offering as it removes the potential for abuse of power and capitalizing on monopolies, which they see as a real problem in the current financial system. As such, my findings support the notion that cryptocurrencies are being introduced with the objective to increase decentralization.

In order to completely tackle these problems of centralisation which they perceive, cryptocurrencies are built with decentralization at their core. In this way, I find that the cryptocurrencies I interacted with have fully embraced decentralization. Looking at how the technology is built in NANO, Colin explained that "Nano operates on a geographically diverse set of nodes, each maintained by a vested third-party". These nodes are given power to help secure the network by users creating the Open Representative Voting system. He further elaborated that they have also built their system in a way that eliminates configurable numbers or decisions which need to be decided on by human actors, particularly those related to monetary returns. Similarly, Maker DAO has decentralized governance of their protocols and are continually increasing the capacity of their system to make decisions by itself and without human interference. According to Gustav, building decentralization into the technology was important to achieve overall decentralization throughout the financial industry, because "if you don't set up the right premise initially…you could have people just going and taking control of the system on their own". Anon 2 also highlighted that having decentralization built into the structure would help influence and determine the culture of the financial industry, stating "if you get (the

structure) right it might be good for a decentralized future for a long time, especially if you get the protocol right". As such, these findings show that increasing decentralization is a clear objective for cryptocurrencies, and they are attempting to achieve this by starting from the bottom and building up. However, how this decentralization will manifest itself was up for debate.

"I think around decentralization…there's such different ethos"

- *George*

Unanimous across all interviewees was the perspective that degrees of centralization lie on a spectrum, and that centralization and decentralization are not a zero-sum game because there was a time and place for both. As such, the general consensus was that the level of decentralization should be determined by the objective and what exactly proponents were trying to achieve. Interviewees acknowledged that decentralization had become a buzzword of sorts and that there had been "a wave of a lot of things that don't necessarily need to be decentralized" (Gustav, Interview). However, this is not the optimal solution, even for cryptocurrency proponents, as they freely admitted that "there's a lot of situations where you want there to be some counterparty" (Gustav, Interview). Incumbents echoed this sentiment, with Rachel stressing that when discussing the value of a decentralised world, "lots of people really shouldn't get there. I don't think that having everything decentralised would do anyone any good". Thus, full decentralization does not appear to be the present objective of cryptocurrency proponents. Supporting this, Mads promoted the benefits of allowing some level of centralization, stating that

"a lot of the centralization we have today, we have for a very good reason which is first and foremost to make sure that someone can be held accountable so that we are actually compliant with all the different regulations"

This argument that there is a time and place for both centralization and decentralization was evidenced by the highlighting of the potential drawbacks of decentralization by its proponents. Some negative side effects that were highlighted were that decentralization can create unnecessary inefficiencies by

involving more people in decision making processes. Gustav argued that “decentralisation, whether it’s in the form of a protocol level or a financial system, creates inefficiency. The more extras you need to participate in a system the more inefficient it will be”. Within Maker DAO, decisions were slow and unagile because every decision had to be taken democratically through a vote, which takes time. Furthermore, Anon 2 stated it can also introduce potential insecurity through the removal of protective layers and that it can prove difficult “to do anything meaningful that involves mainstream adoption”.

Given that even the cryptocurrencies themselves freely admitted that decentralization should be appropriately adopted, it can be inferred that the level of decentralization sought after by cryptocurrency supporters is a purposeful amount. That is to say, they do not appear to be seeking the indiscriminate overthrow of all forms of authority and third-party middlemen. Rather, cryptocurrency supporters appear to be attempting to progress an efficient decentralization, whereby problematic and unnecessary actors are removed, and power is redistributed for superior performance of the financial industry. This is an important point for judging the progression of decentralization within the financial industry. This is because assuming an objective of more radical decentralization on behalf of proponents would imply the need to assess levels of what I label ‘external decentralisation’. This refers to the number of actors with control and involved in decision making processes across the industry. However, the pursuit of a more efficient decentralization could suggest an impact on what I label ‘internal decentralisation’ as well, or even instead of external decentralization. Internal decentralization refers to the level of decentralization of the actors within the industry. Given this, I argue that cryptocurrencies progress both internal and external levels of decentralization in order to effectively increase efficiencies. Thus, the analysis of the progression of decentralization should not just involve assessing the extent to which banks and governments have been overthrown, which I believe there has been a tendency to do when assessing the impact of cryptocurrency.

4.2 Current situation from the perspective of new and old players

“I would say that right now the space is still very, very small, very early stage. But there’s definitely a lot of interest from the financial industry”

– Gustav

"I would say that cryptocurrencies have brought an element of decentralization and have, to a certain extent, succeeded in doing so."

- *Anon 2*

Despite the relatively low adoption of cryptocurrencies, change still abounds amongst incumbent players, which I define as banks and other financial service providers, and in the perceptions of customers. While cryptocurrency proponents lament the slow progression and resistance put forward by these players, my research suggests that there is still progress. In order to appreciate this progress and the reasons for the slow progression, it is important to first describe the starting point for cryptocurrencies. From interviews, it was clear that original perspectives and approaches to cryptocurrencies was less than friendly, with the motto "Bitcoin is bad, blockchain is good" neatly summarizing the general consensus of banks at the time and up until late 2017 and early 2018 according to Anon 2, and many seeing it as just another pyramid scheme according to Mikael. Anon 1 even suggested that for the first five years, many incumbents refused to interact with cryptocurrency companies. This was largely due to the negative PR surrounding the emergence of Bitcoin, due to events like Silk Road. As such, the perspective of most incumbent players at the time was that this was not something they wanted to be involved with, because of connotations with financial crime, fraud and high volatility, according to Mads. This points to another reason for the hesitancy to engage with cryptocurrency technology; lack of understanding. As Mads pointed out, we are not all "tech savvy" enough to have immediately understood what a monetary system based on cryptography implies, nor how to use the various new technologies that it brings with it. Consequentially, many interpreted the technology as a negative, threatening object because they simply couldn't understand it.

Since then, other factors have contributed to incumbents' hesitancy to engage. One such reason is regulation, as the slow process of regulatory systems has inhibited the progression of cryptocurrencies and their ability to reach full mainstream adoption and engagement with incumbents. For banks, lack

of regulation around the new innovation completely disallowed any involvement with it, because according to Mads, banks “don’t try first and then ask later. That’s not how banks work. We ask first and then try later”. The lack of understanding of cryptocurrencies and regulation around them combine to form a negative perception of cryptocurrencies and the decentralized financial system they attempt to promote. As Rachel surmised, “they really don’t want to explore that area right now just because it is so murky because of the reputation of crypto”. Lastly, another reasonable explanation for hesitancy on behalf of banks was their fear for survival. Despite a lack of real understanding as to what this new technology implied, many still at least understood there was potential for it to disrupt their system. And thus, choosing to interact and engage with it would require a willingness to be disrupted, which, understandably, made many nervous to the point of refusing to interact. UBS questioned exactly this in a recent report, concluding that cryptocurrency technology has the potential to disrupt the business models of many incumbents (Batlin et al, 2016). Cryptocurrency proponents lamented this unwillingness on behalf of banks to disrupt themselves, with Mikael complaining that “they spent billions and billions of money on making their centralised structures. They’re not interested. It disrupts their own current business”. Combined, these factors of slow regulatory process, lack of understanding and incumbents’ desire to protect their interests has created a scenario of sincere disengagement and even hostility towards cryptocurrency technology and the disruption to the financial industry it offered.

However, the scenario has since evolved. Over time understanding of the technology and its proposition has improved and regulation has begun to catch up. Regulation is no longer seen as a such a “foe” of cryptocurrency, and instead is seen to just be trying to “secure people and give it a legal framework which can somehow make everyone happy” according to Jan. Anon 1 reinforced this statement by stating that all the major players in cryptocurrency technology are now engaged in talks with the regulatory bodies. But most interesting, is the increased acceptance and engagement of incumbents with cryptocurrency technology. Incumbents now acknowledge that the disruption presented by cryptocurrency technology is inevitable and therefore must be accepted (Accenture, 2017, Reid and Templeman, 2019). They are also increasingly approaching players from the

cryptocurrency industry to help educate themselves, as highlighted by several of my interviewees and this is expected to continue to increase. Jan summarized the change succinctly when he stated:

"Over the last three years, I was ringing all the ballots, knocking at the doors, calling all people, adding people on LinkedIn, attending conferences and everyone was looking at me like "Ah yeah cool, Blockchain. You're like those dark net guys, right?". And right now, I have the feeling that things are changing. After the GS1 event, they came to me and asked me "Hey, maybe we can someday have a workshop where you can explain how this blockchain stuff works", so they can understand cryptocurrency payments"

Further supporting this, a report from UBS (Batlin et al, 2016) and insights from my interviewees highlighted the championing of cryptocurrency technology by incumbents, and banks in particular, which largely manifests in the increasing establishment of blockchain departments, as well as other signs such as the creation of their own tokens. Indeed, Mads and Rachel work in exactly these types of departments within Danske Bank and Deloitte, respectively. Danske Bank's department is two years old and currently only has two employees working within although Mads was quick to point out that "of course there are a lot of other people who are engaging with topics related to this or participating in projects". Even more promising, Mads detailed how Danske Bank was beginning to engage in decentralized projects as part of their engagement with this technology. For example, they had recently undertaken a project involving property transactions. Previously the process for a property transaction was "very antiquated" that was "all based on papers" and involved several different parties such as the bank of the sellers, the bank of the buyers, a real estate agent, the buyer, the seller, tax authorities and the land register (Mads, Interview). Given the process involved the transfer of many details and documents, and involved so many different parties, it usually took at least a month. To improve this, Danske Bank built a large shared database using cryptocurrency's blockchain technology with all parties who could be involved in these types of processes. As Mads describes it, it has "totally reshaped how that entire sector works around this common data infrastructure." Furthermore, despite having been commissioned by Danske Bank, it is "certainly a more decentralized way of doing things because no one in particular drives or owns this platform we all share".

Rachel, on the other hand, works within Deloitte's EMEA Blockchain Lab, one of 3 that Deloitte has established globally. Interestingly, Deloitte's EMEA Blockchain Lab significantly predates Dansk Bank's department, having been established approximately five years ago. Furthermore, it initially focused on financial services, before moving into more broader use cases. The EMEA Blockchain Lab works with many of the financial industry's incumbent players, with one of its biggest projects involving three of Ireland's biggest banks. When describing the typical projects undertaken within the Blockchain Lab, Rachel emphasised that they primarily worked on helping incumbent players "move from that period of competition to co-petition" and working with their traditional competitors on industry-wide problems. She continually referenced that there was "a journey we have to bring clients on" in regard to helping them adapt to the idea and opportunities of decentralisation. Furthermore, in a promising statement, she claimed that there appeared to be not only increasing interest in these types of projects, but also an increasing willingness to engage in these more decentralised approaches to working.

In addition to making progress internally, there is also other progress to be noted in the industry, such as the emergence of consortiums around the topic of cryptocurrencies and blockchain, such as the R3 Consortium. This was founded by a software enterprise company and currently has 250 financial service companies, such as banks and other related companies (Mads, Interview). As Mads put it, "the idea is to have this common place where the financial industry could try and talk about this new technology and how we could potentially use it". Interviewees also highlighted the increasing joint presence of incumbent players and cryptocurrency companies at industry conferences, both those which were organized by cryptocurrency companies and those traditionally reserved for the main financial industry players such as meetings of parliament. As such, the evidence strongly suggests that, currently, incumbents are beginning to engage and interact with cryptocurrencies and the ideologies behind them.

Interestingly their motivations for doing so vary, especially depending on who was asked. These motivations for interacting are important to understand, as they could indicate the likelihood to

embrace the decentralization aspect of cryptocurrency technology. By this logic, those with strong motivations to engage and interact with cryptocurrency technology would be more likely to fully embrace it and the ideologies behind it, as opposed to merely extracting the technology for implementation. To this end, my research produced mixed results. Many felt, particularly within the cryptocurrency space, that banks and other incumbent players were only beginning to engage with cryptocurrency technology because they faced becoming antiquated and redundant otherwise. As Anon 2 surmised, "for them it was kind of a necessity to remain relevant". George added to this, stating

""I think (incumbent players) don't want to be left behind, this race to leverage new technology is likely the reason why they are researching. They want to be first-movers. Cryptocurrency is happening, the choice is there for people to use. And so I think governments and financial institutions are looking to make sure they're not left behind in an archaic industry"

Mads himself acknowledged that incumbents' motivation may have been fuelled by the perceived legitimization of the technology by larger technology companies, namely with Facebook's introduction of Libra. Speaking about big technology players picking up on the technology, Mads claimed that "when that happens, I can assure that the banks start think about their existence. So that is something I would say is definitely a big drive for us to be rethinking our business models". Indeed, the mere fact that big technology companies are picking up on cryptocurrencies to the extent that they are illustrates the change in perception and levels of engagement with cryptocurrencies within the industry. However, ultimately Mads and Rachel felt that banks in general were showing "increased interest in being part of this new, exciting activity" (Mads, Interview) because "people are now beginning to see the opportunity" (Rachel, Interview). Anon 2 also acknowledged, that while a minority, some of the incumbent customers of Chainalysis were "coming to us saying 'Hey we think cryptocurrency sounds cool, could you tell us a bit more?'". This more optimistic interpretation would suggest positive implications for the progression of decentralization through cryptocurrency technology, although it would appear that the motivations for most incumbents are instead survival focused and driven out of necessity.

Despite all these positive changes, obstacles are still present and stand in the way of cryptocurrency's development. First and foremost, despite the progress made, regulation still poses a significant obstacle to the further development of cryptocurrency. According to Rachel "a lot of legalities are very, very murky at the minute. You can say something today that could very well be changed in the legislation tomorrow." This lack of clear regulation prevents incumbents from further interacting with the technology and it's ideologies. Mads confirmed this, stating that it puts banks in "a very precarious situation as it basically disallows us from participating in the cryptocurrency system, essentially". Equally, the lack of regulation is frustrating for cryptocurrencies as it leaves them unsure how to act. As Mikael argued "one thing people underestimate is that companies do not necessarily want free regulation. What they want is certain rules". Having regulation, regardless of whether it is soft or hard, allows cryptocurrencies to adapt, which Mikael argued was important for these new entrants to be able to build a presence in the market.

Cryptocurrency's unintentionally garnered bad reputation arguably further compounds this issue, making regulators more hesitant to increase its permissions within the industry and feeding incumbents hesitancies. This in turn, is worsened by the lack of real understanding of cryptocurrencies that is still prevalent in the market. As George observed, "the misunderstandings are huge. I think people just don't think about money in that way". Rachel confirmed this, stating that "a lot of banks do not trust cryptocurrency, because they do not understand it". Many incumbent players, from consumers to banks, still cannot fully comprehend what cryptocurrencies are and what they can be used for. Mikael explained that this is because "they have to evolve into these ways of using it and that's really hard". Lidia also referenced that they "still talk to a lot of people who don't know what's happening in the blockchain. They can't understand this". People struggle to understand both the applications for cryptocurrency technology, as well as to fully conceptualise the new way of doing things that cryptocurrencies propose, and thus also the benefits it could potentially present for them. In particular, according to Mads, this is difficult for "something as grown and mature as financial services". Combining these last two obstacles, it becomes clear that one of the biggest obstacles for cryptocurrencies is psychology, "scepticism, fear and lack of trust from people". This of course is a formidable challenge to

overcome, although the evidence above seems to suggest that cryptocurrency has made some strides in the right direction.

4.3 Predictions for the Future of the Financial Industry

Given cryptocurrency's starting point, and its current standing in the financial industry, it seems appropriate to now analyse the expected future for cryptocurrencies. Surprisingly, the predictions for cryptocurrency technology's outcome were relatively unanimous across all interviewees. Collectively, all interviewees agreed that the future would likely be that of a hybrid-scenario, whereby centralized incumbents continued to exist but with more decentralized infrastructure, with only one notable exception. An article published by Citi Group suggested that the likely outcome would still be an either-or situation, with either cryptocurrency companies or incumbents emerging victorious (McLaughlin, 2018). The author argued that while cryptocurrency posed some legitimate value offerings and made "valuable contributions to the evolution of the monetary system", incumbents could still respond to needs cryptocurrency solutions currently address, and thus eliminate the need for cryptocurrency (ibid). This would then return the financial system to the fully centralised system we had pre-cryptocurrency's introduction. However, this perspective was an exception and most interviewees felt that the progress made by cryptocurrency technology was irreversible and here to stay, leading to the development of the co-existence of centralised and decentralised players.

Proponents belief in this hybrid solution was based largely on the fact that most felt strongly that full removal of any and all centralization was not optimal. As Jan described it, "it needs a hybrid centralized management and a decentralized infrastructure below it". Gustav stated that he believed "that there will always be a need for centralized financial services", and Mikael seconded this stating that "I think having centralised players is part of the present but definitely also part of the future". Proponents felt that decentralisation would partially prevail through the removal of some unnecessary middlemen, with Deutsche Bank even arguing that the coming decade would see the removal of many elements which have been, until now, ingrained in our financial system (Reid and Templeman, 2019). Interestingly, proponents felt that banks were not likely to be amongst those who would be removed,

with Mads stating that “the systems we are considering would certainly cut out middlemen, but it wouldn’t be the banks”. The continued existence of banks would thus ensure a centralized element within the future financial industry.

Some may argue that while it may be necessary to keep banks in this future, they should conform to the new imagining of the financial industry and become fully decentralized. However, it was clear from my interviews that this was not a sensible or even desirable option.

“For anything a bank’s going to be part of its quite obvious its never going to be pure decentralization. That just doesn’t make any sense, because we are the essence of a centralized institution”

- *Mads*

Thus, while some centralised players would be removed in favour of greater decentralisation, converting the remaining centralised players to being decentralised was not part of the objective. This is because, as evidenced above, no one saw value in a fully decentralised ecosystem and instead favoured an outcome where some centralised players would still exist. Consequentially, if the financial industry won’t become fully decentralised and nor will it remain fully centralised, it must then become a hybrid solution of both. However, this will require change on both sides, and in particular that the incumbents adapt to new business models. Ultimately, this finding would suggest the introduction of new roles and value offerings for all actors in the financial industry as cryptocurrencies can repackage the conventional financial service offerings and thus provide consumers with new and unique offerings. As frequently boasted by many cryptocurrency coins, cryptocurrencies can offer storage of value, payment and transfers all in one without the conventional fee structure, thus simultaneously taking on the role of bank, currency and payment intermediary. This will arguably force consumers to reconsider and potentially redefine their interpretations of what actors conduct what roles. For example, Gustav argued “if you look at what we’re doing, we are a bank, right? We print our money. We regulate the monetary policies on them”.

As a result, interviewees and industry players, such as Accenture (2017) predicted that it is likely that the role of incumbent players will be brought into question. With new cryptocurrency-era companies taking over some of their roles, incumbent players may have to reconsider their value offerings, but equally so too may their consumers. Anon 2 proposed that the defining question on the minds of both consumers and actors such as banks and financial service providers will be "where do they create value?". Consumers will be critically assessing the offerings they have been offered to date and holding them up to the standard that cryptocurrency companies are now setting. In turn, financial service providers will need to reconsider the areas that they create value in and if their offerings need to change to accommodate the larger changes within the industry. There were multiple suggestions for how they can do this, ranging from general suggestions that they would be "acting as partner banks" to "provide the functionality that these companies generally asked for" (Mads, Interview) to banks' potential to act as a convening power (Accenture, 2017) to more specific suggestions such as to "change from holding money to holding of private keys of customers" (Lidia, Interview). This changing of roles would replace the full disintermediation that cryptocurrency technology's disruption potentially threatens, merely eliminating some roles and drastically changing others instead.

Clearly, financial service providers may be obliged to change how they operate in order to provide their value offerings as a result of disruption because of cryptocurrency technology. Mads strongly emphasized that working with cryptocurrency technology depends on a "willingness to work together". This is necessary for two key reasons. The first is that the technology itself necessitates it. Implementing and/or engaging with blockchain and cryptocurrency technology requires decentralization and cannot be done by simply stripping the technology and applying it in a centralized manner. Rachel emphasised this by stating that "blockchain projects require a little bit more fluidity in thinking and a little bit more in the way of a decentralised thinking and not being focused on who owns everything". However, as Mads argued, "people have a tendency to focus on technology first, not realizing that decentralization is impossible to take out of that equation because it's what gives you value". It therefore goes without saying that in order to successfully exist in this hybrid financial industry, incumbent actors will have to begin accepting this reality, and consequentially increase their willingness to collaborate.

"We have to get away from our old ways of thinking where we're each doing our own thing and competing with each other. Because that mentality just doesn't work if we are to work together, which is a necessity to do anything with these technologies."

- Mads

The second reason for this need for increased collaboration, is that incumbent players will need to find new competitive advantages given their new competition, and closer collaboration with others may provide this. According to Mads, doing so may allow them to "solve a problem in a new way that you didn't do before". Rachel furthered this idea, referencing how some clients were scared into inaction by the potential disruption this technology could bring, while others embraced it and took advantage of it. Specifically, she discussed how the CTO of one client realised that blockchain stood to disrupt their entire industry and potentially invalidate the client's strong market positioning. Rather than trying to fight off this disruption, they decided to take control of it and disrupt themselves before they were disrupted, to their own benefit. As such, the alternative, current approach of many incumbents, of adopting a "we're the best and we can do everything" mentality will arguably be their downfall and hurt their ability to survive against the new, emergent innovators that cryptocurrency companies represent.

Ultimately, these future predictions depict a coherent vision of a hybrid financial industry, that will presumably lead to rethinking and redefining of the roles and activities of actors within the industry.

4.4 Tactics Employed by Cryptocurrency Proponents

Having established the transition of the financial industry to the current situation and the predictions of the interviewees for its continuing evolution, the remaining question thus centres on how cryptocurrency technology is enabling these transitions. My research revealed that cryptocurrency proponents are enacting multiple tactics to encourage their development and the progression of decentralisation in the financial industry. The most prominent tactics involve legitimizing, adapting and educating.

4.4.1 Legitimising

One of the strongest tactics being employed by proponents involves working with incumbent players to gain trust and legitimacy in the eyes of consumers. Cryptocurrency companies are seeking to increase their legitimacy in several ways, one of which is through creating partnerships and working with incumbent financial service providers. For example, a quick google search will show that many cryptocurrency exchanges allow you to purchase cryptocurrency with a Visa or Mastercard or by paying with your PayPal account. Additionally, further googling will also show that many cryptocurrencies are now working to provide their currency holders with Visa or Mastercards. Jan also discussed how cryptocurrencies and incumbents were beginning to hold industry conferences together, where incumbents and cryptocurrency representatives sat together on discussion panels and boards. For example, he himself sat "as a board member next to Com Direct and IBM". Another example of this legitimization is the growing coverage of cryptocurrency in reputable media outlets, such as Maker DAO's recent article in Børsen, a very well respected Danish business newspaper, which Gustav proudly mentioned.

Furthermore, cryptocurrencies are using the infrastructure, namely the software and hardware, of incumbent players as a means of providing their services through a medium recognized and trusted by consumers. For example, many cryptocurrency companies are offering their services through incumbents, so it may even seem to a consumer that their financial service provider is providing this new, innovative service, when in fact in the background it is being run by the cryptocurrency companies. They are also using the hardware of checkout terminals as a means to enable cryptocurrency payments, despite these being unnecessary for a cryptocurrency payment process. As Jan surmised it

"It's easier to integrate the software that's needed for crypto acceptance into the already existing hardware compared to selling merchants new hardware'"

Increasing the presence of cryptocurrency company names alongside well-known names of established players was deemed to be important for cryptocurrencies to earn more credibility and having a greater chance of being supported by both interviewees and industry players (Reid and Templeman, 2019). It

also contributed towards destigmatising cryptocurrency and its overall ideologies. Jan acknowledged this when he stated

"I see those Worldlines and Ingenicos, all these traditional people, as enablers. Of course, it would be awesome to get rid of them because cryptocurrencies don't need them. But in the current situation it's very important to work with them because they are trusted entities."

4.4.2 Adapting

This pillar of the strategy has been important, although could potentially be an unconscious activity on behalf of cryptocurrency proponents as it was acknowledged mostly by incumbents. This involves said cryptocurrency proponents adapting to the context and situation they find themselves in, which is a highly centralized, regulated and established industry, and refining their objective of increasing decentralisation accordingly. As a result, this has involved cryptocurrency and decentralization proponents relaxing their calls for full decentralization and accepting that the fully decentralized vision they hoped for will likely not come to fruition. Equally, however, incumbents have had to begin to accept that their hopes to completely squash any and all attempts for decentralization will not succeed, and that they may have to accept a degree of decentralization in the future, because as Mads argued, "this isn't going away very easily". These have been bitter pills for both sides to swallow, with incumbent players having to accept the disruption to their existence and cryptocurrency proponents being forced to acknowledge that full elimination of third parties is not feasible in the foreseeable future and that they thus must work with those they wanted to remove.

"You can't just ignore that regulation exists, for instance. And I think that's a realization that has taken a long time for a lot of the hardcore decentralization fans to sort of realise. I think they're coming around to it a lot more now. While, you know, at the same time, the banks are becoming more open to this new idea."

- *Mads*

4.4.3 Educating

As established, one of the major obstacles for cryptocurrency technology is a lack of understanding, with Mikael surmising that education of the users "is a really, really hard thing. It's a really steep curve". It would appear that cryptocurrency companies have realized this and are now actively working towards this. As such, this tactic revolves around cryptocurrency proponents working towards improving the knowledge and understanding of cryptocurrencies and the decentralized financial system they propose. This has been an important part of ensuring that cryptocurrencies survived during their initial introduction to the mainstream financial industry amidst intensely negative PR and criminal associations. Now, it is even more important given the increased interest of incumbents in learning about and understanding it. As such, there is a focus on "educating people about the advantages of this decentralized world" (Lidia, Interview) as "It's important to educate financial institutions and governmental bodies on how this technology works, and how it can be best leveraged moving forward" (George, Interview). This helps ensure that the technology is correctly understood and thus applied to best develop the financial industry of the future, while also addressing the negative reputation of cryptocurrency by correcting misunderstandings. Each of these directly work towards overcoming obstacles which stand in the way of cryptocurrency's progression.

4.5 Conclusion

In conclusion, my research presents some extremely interesting findings for answering my research question of how the introduction of cryptocurrency technology has impacted the level of decentralisation within the financial industry. First, it is clear that cryptocurrency's initial introduction was met with intense hostility, making the development of any sort of market presence difficult. Despite this, my findings reveal that progress has been made and that cryptocurrency's current position is now much more favourable, indicating that changes have been made over the last ten years. Most interesting, is the fact that incumbents and cryptocurrency proponents' predictions for the future appear to have harmonised, as they all outlined a coherent vision for the future of the financial industry, where both incumbents and cryptocurrencies would play a role. This can be largely attributed to incumbent players' growing willingness to accept the benefits that decentralisation has to offer. This

increasing acceptance on behalf of incumbents is arguably a result of cryptocurrency proponents' multi-faceted strategy to increase the presence of cryptocurrency technology, primarily through increasing its legitimacy, adapting to the overall context and educating incumbents. From these findings, I draw the conclusion that cryptocurrency technology has increased decentralisation within the financial industry and looks likely to continue doing so. In the following section, I will outline and discuss my analysis of these findings which has led me to and supports this conclusion.

CHAPTER 5: ANALYSIS

In the following section I will analyse my findings in order to answer my research question. As stated above, based on my findings I determine that cryptocurrency technology has increased decentralisation within the financial industry. As such, I will first present my analysis of the findings that led me to this conclusion. I will then explore how cryptocurrency technology appears to have achieved this by applying relevant theoretical frameworks. To do this, I will first discuss how cryptocurrency technology caused a changed by forking the financial industry, rather than instigating an exit or voice approach. Then, given that I have identified that cryptocurrency technology promotes two forms of decentralisation, I will discuss the different ways it contributes to each form. I will argue that the way it promotes internal decentralisation can be explained by socio-technical theory and the phenomenon of proto-institutions, and that the contribution to external decentralisation can be explained by a robust action strategy and legitimacy theories. I will then argue that these four means of contributing to increased decentralisation are successful as they collectively target the institutional infrastructure of the financial industry. By applying these theories, I intend to show that the various ways cryptocurrency technology increases decentralisation are supported by respected theories and thus can be deemed as legitimate processes to enact this change in the financial industry. Thus, this analysis serves to support my argument that cryptocurrency is increasing decentralisation and of how it does this.

5.1 Cryptocurrency Technology's Contribution to Decentralisation within the Financial Industry

First, it is clear from my findings that decentralization is a foundational element of cryptocurrency technology as it is a core element of the ideologies behind the creation of cryptocurrency technology and is also built into the technology. As such, I conclude that as cryptocurrency technology develops its presence in the market, it simultaneously increases the levels of decentralization, as the two cannot be separated. It also became evident from my findings that the decentralization being discussed and envisioned by all relevant players, new and old, was multi-faceted. Both cryptocurrency proponents and incumbent players acknowledged that decentralization and centralization were two ends of a spectrum, and the degree of either expressed depended on several variables, such as the overall objective of a project. As such, the degree of decentralization ultimately expressed in the financial industry would be as a result of the combination of the objectives of incumbent players and newer cryptocurrency players. Equally, it is important to identify the different ways decentralization is expressed in the financial industry, namely internally or externally. I determine that cryptocurrency proponents and incumbents appeared to refer to both when discussing decentralisation. It was also clear that they had different objectives for each form of decentralisation and analysis of my findings revealed that there was also different progress being made in each realm of decentralization for each player within the financial industry.

As such, a key contribution I wish to make to the discourse and analysis of the progress of cryptocurrency technology is that it must involve analysis of both external and internal decentralization within the industry to give an accurate overview of the situation. I identify external decentralization as referring to the removal of intermediaries from cross-player industry processes. An example of this could be the elimination of payment intermediaries such as PayPal for the process of transferring money from one consumer to another. In essence, this refers to disintermediation of the financial industry. Alternatively, internal decentralization refers to the reduction of centralized power within an organization. An example of this is Danske Bank's project in Finland where they created a shared database with other players to complete a specific process, reducing each party's power and ownership

over the process. This is primarily expressed through a willingness to collaborate and share ownership of activities. This distinction in types of decentralisation is important to make and keep in mind when analysing cryptocurrencies because of how they contribute to increased decentralisation, which they do in two ways.

First, as highlighted by the cryptocurrency companies, the technology has the capacity to eliminate many intermediaries as it can arguably do their job more effectively. This requires analysis of the external decentralisation levels to assess the promotion of decentralization by cryptocurrency technology. Secondly, as highlighted in particular by Mads and Rachel, in order to effectively make use of the technology, you must also approach it in a decentralized manner and be willing to decentralize the processes you introduce it to. As such, it is equally important to examine the internal decentralization that it necessitates. Thus, it is clear that cryptocurrency technology's contribution to increased decentralisation is two-folded and this must therefore be incorporated in assessments of cryptocurrency technology's contribution.

Consequently, I incorporated this when examining whether decentralization has been increased and found that cryptocurrency technology has actually made substantially more progress than one would assume at first glance. This may explain why many argue that cryptocurrency technology have made little impact on the financial industry, as most primarily examine the external decentralization levels which are most easily observed. I have illustrated my findings in the below graph and will further explain them in the following paragraph.

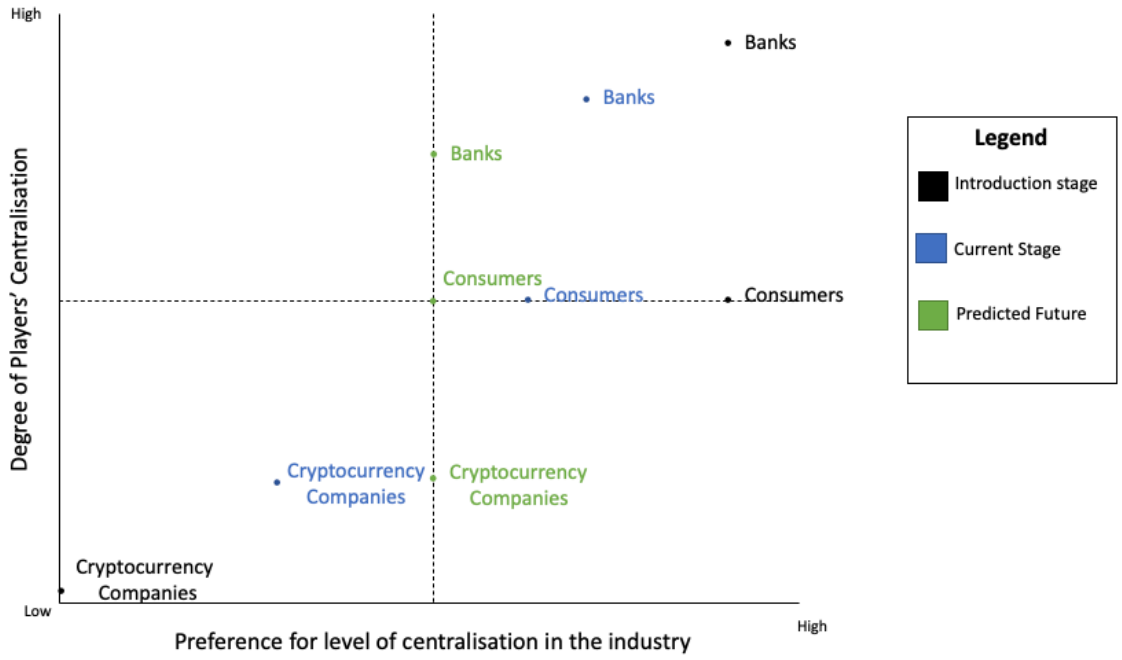

Figure 1: Visual representation of the development in industry player's levels of and preferences for centralisation

I will first explain the development of the position of banks as, based on my findings, they have and will continue to undergo the greatest change. Based on my research, it was clear that banks' initial interest and willingness to interact with cryptocurrency technology and decentralized financial services was extremely low if not non-existent. As such, their starting position was that of being extremely centralized internally and having a high preference for the financial industry to remain centralized. This seems to have been based on a genuine concern for the financial security of their customers, but also a desire to retain their control within the industry. However, from interviews, it is clear that the perspective of banks is beginning to change, and we can already see the effects of this, such as through the decentralized project within Danske Bank and Deloitte's many projects and multiple Blockchain Labs across the globe. They are also expressing more interest in understanding and working with cryptocurrency companies. As such, I find that currently, the level of their internal decentralization has slightly increased, as has their willingness for external decentralization. Based on the predictions for

the future detailed above, it appears likely that the banks are eager to continue and increase the number of their collaboration projects and are more open to the idea of a hybrid situation in the financial industry whereby decentralized and centralized parties and processes would be equal and coexist. As such, it is likely that their internal decentralization will continue to increase, as will their willingness for external decentralization. These changes are all directly driven by the introduction of cryptocurrency technology and it's continuing presence in the industry, and as a result, I find that cryptocurrency technology has and continues to promote both external and internal decentralization amongst incumbent players.

Amongst consumers, levels of internal decentralization of course do not directly apply and thus they can be found at a neutral level on the graph. However, I still find that changes can observed in their willingness for external decentralization, which are directly attributable to cryptocurrencies. All interviewees from both the incumbent side and the cryptocurrency side referenced the slowly growing interest of consumers in cryptocurrencies and the benefits of decentralized finance. As such, despite the initial negative perceptions of cryptocurrency technology when it first emerged into the mainstream due to connotations with Silk Road and interpretations as fake internet money, the position of consumers on cryptocurrency technology has transitioned from low willingness for external decentralisation, to a slightly higher level of willingness. Given the current seemingly positive correlation between the increasing presence of cryptocurrency technology in the market and consumers' increasing willingness for external decentralization, it can be inferred that, assuming cryptocurrency technology continues to increase its presence in the market, consumers' willingness for external decentralization will also continue to increase. Ultimately, my analysis of incumbents' increased decentralisation is directly supported by my findings, whereby despite their specific opinions, all interviewees answer 'yes' when asked if they felt cryptocurrency technology had increased the level of decentralisation in the financial industry.

Lastly, the progress of cryptocurrency technology itself interestingly seems to portray decreases in internal decentralization and acceptance of decreasing external decentralisation in comparison to their

original ambitions. When first introduced, proponents of cryptocurrency and the technology behind it largely seemed to have ambitions for full and complete decentralization, internally and externally. However, as time has progressed, cryptocurrency companies appear to have adapted to the context of the financial industry as discussed in my findings, and as such have adjusted their expectations for internal and external decentralization accordingly. Cryptocurrency companies' internal decentralization can be seen to have decreased marginally due to their partnerships and co-operation with centralized incumbent players as part of their attempts to increase their legitimacy in the eyes of consumers. As such, some elements of the services they offer consumers are now centralized. These partnerships and collaborations with centralized incumbent players account for both their decreased internal decentralization and their increased willingness to accept decreased external decentralisation. By working with centralized players, they are by nature accepting decreased external decentralization, choosing to work with the middlemen they see as redundant rather than attempting to eliminate them. Based on the future predictions outlined in my findings, it seems likely that cryptocurrency companies will not decrease their internal decentralization further as it is so core to their existence, but they may increase their willingness to accept decreased external decentralization as they acknowledge that redundant middlemen may adapt their business models to fit into the new financial industry.

Conclusively, these findings demonstrate that cryptocurrency technology, despite surprisingly reducing its own levels of decentralization, has increased decentralization within the financial industry, both externally and internally. This can be attributed to the fact that the technology itself requires that the processes around applying the technology must be decentralized, forcing centralized players to incorporate more decentralization contributing to greater internal decentralisation, and because the technology has the capacity to eliminate unnecessary middlemen and thus positively impact external decentralization. As such, cryptocurrency technology has clearly increased decentralisation within the financial industry.

Interestingly, despite much of the cryptocurrency literature citing three primary motives for the introduction of cryptocurrency technology and greater decentralisation, my findings suggest that they

did not provide equal incentives for the increased willingness for increased decentralisation. As argued by Swan (2015) and supported by Maurer, Nelms and Swartz (2013) and Atzori (2015), one of the motivations for increased decentralisation according to the literature was the inefficiency and outdatedness of a centralised approach. My findings support this argument, with interviewees referencing the opportunities presented by cryptocurrency technology as a reason for their increased willingness to engage with the technology. Maurer, Nelms and Swartz (2013) and Huber, Hays and Valek (2019) also argued the unfair monopolisation of incumbent players and their ability to charge excessive fees thanks to these monopolies were an additional motivation to increase decentralisation, to eliminate these unnecessary middlemen and their unnecessary fees. Again, my findings largely support this as many of my interviewees acknowledged that many middlemen could be removed from the industry as a result of cryptocurrency's introduction. Lastly, Maurer, Nelms and Swartz (2013) argue that financial control is another key motivation for the increase of decentralisation. However, my findings did not support this, as most interviewees in fact argued the opposite, that centralised players were needed to appropriately manage and safeguard at least some aspects of the financial industry.

I will now further analyse how cryptocurrency technology has achieved these increased levels of decentralisation through application of theoretical frameworks, starting with exploring how cryptocurrency has approached instigating this change in the industry as a whole.

5.2 How Cryptocurrency Technology has Contributed to the Increase of Decentralisation in the Financial Industry

5.2.1 Forking the Industry to Enact Change

As discussed by Berg and Berg (2017), consumers have typically been understood to have two means of influencing change on industries and firms, and this is by exiting or using their voice. However, Berg and Berg propose a third alternative, which they label forking. This involves taking an existing set of institutions and using them to create a new society with this shared history, but by allowing it to develop in a different direction (2017). I suggest that this is how cryptocurrency technology influences the

change from the traditional centralised financial industry to a more decentralized financial industry. This is based on both the logic that forking is the most optimal option for the situation and corroborating evidence from my findings that show that forking is the chosen option. I will first explain why I assume that forking is the most optimal solution. An exiting strategy would require consumers to remove themselves from the financial system, which would be extremely inconvenient and impractical, while voicing would rely on asking incumbents to bring the change that consumers voiced is needed. Forking, on the other hand allows consumers to continue to exist within the system that they require to conduct their daily lives, while still enabling them to develop this system in the direction they deem preferable. However, rather than simply relying on my own assumptions, my findings validate these assumptions by illustrating that the other strategies are not viable in this context.

Looking first at the potential for an exit strategy to be enacted, it becomes clear that consumers are not willing to remove themselves from the safety of the firmly established system with which they are familiar with. This is first and foremost because it would be massively inconvenient, requiring consumers to completely disengage from the modern financial system, making basic activities such as getting paid, storing money or even purchasing goods, like food, difficult. Aside from the inconvenience, an exiting strategy would also be a huge task due to the trust consumers have in their current system, despite its potential flaws, and their fear of their unknown. Even now, when a somewhat viable alternative is being presented in the form of cryptocurrencies, consumers are hesitant to abandon the familiar. This was evidenced when Jan referenced the fact that his mother would continue to use banks in the current financial system “even if they are the Kings of money laundering”, because it was what she knew and was familiar with. Given the hurdles that would be present for an exit to occur, of huge inconvenience and fear of the unknown, it seems highly unlikely to be a viable option for cryptocurrency to influence change within the specific context of the financial industry.

Alternatively, a voicing strategy can also be deemed unlikely to happen, based on the fact that it, quite simply, would require consumers to voice their demand for an alternative system. Given that all interviewees, regardless of their position, acknowledged that most consumers didn’t fully understand

cryptocurrency technology, nor the need for decentralisation, it is unlikely that these same consumers would then voice the need for either. My findings show that the need for this new financial system has been identified by a select few, and they are pushing their solution onto consumers by attempting to teach them of the benefits it could entail. For example, Anon 1 stated that they themselves "didn't understand why there was a need for another currency" at first, supporting the argument that many consumers wouldn't understand the need enough to voice it. George also stated that "it's definitely us going to them at the moment" supporting that even now consumers are not voicing a need, the push is coming from cryptocurrency proponents. As such, a voicing strategy is not the optimal strategy, as it would require cryptocurrency proponents to invest a lot of time and energy to educate consumers about the benefits of their new system, and then again to convince them to voice their preference for this system, before making any real progress.

Thus, forking becomes the last viable strategy and this is because it overcomes the challenge of both of the previous options. It removes the need for consumers to abandon the familiar, and in fact utilises the familiar to entice consumers to the alternative strategy. A forking strategy takes the familiar infrastructure of the current system, and builds on it, albeit in a different way than the current system would. Within the context of the financial industry, this allows consumers to stay within the current financial system and even begin to engage with the new system through it. This is evidenced in my findings by the references to cryptocurrency building on top of the current system's hardware and software (Jan, Interview). Maker DAO also makes use of incumbent players because they see them as trusted entities, and so use them as an interface for consumers to see while interacting with Maker DAO technology behind it (Gustav, Interview). It also allows proponents to build the system in parallel to the current system, so that they can gradually educate consumers of the superiority of their system while they develop it, rather than having to do this in a sequential order. As such, forking can be intuited to be the ideal solution for the system, support for which can be found throughout my findings.

However, as history has proven time and time again, humans do not always choose the optimal solution. So, I will now demonstrate how my findings corroborate that cryptocurrencies are attempting

to fork the industry. Firstly, my research finds that the financial system cryptocurrency proponents are attempting to build is founded on similar institutions and ideologies as the current financial system. As explained by Swartz (2018) the two main camps of cryptocurrency proponents both build on traditional economic theory and are even built on many of the same principles that an older version of the current financial system was also built on, namely that the value of money should be backed by assets such as precious metals. Anon 1 also argued that "the economics at the end of the day are all based on economic theory". Furthermore, the building of cryptocurrency's ecosystem is occurring in parallel to the current ecosystem and so does not suggest the "either/or" option an exit strategy would present, further supporting the argument that the industry is being forked. Thus, it can be determined that cryptocurrency technology influences change by taking the shared history of the financial industry, and building on it, albeit in a different way than the centralized financial industry would develop if it was left unchallenged. Put simply, cryptocurrency technology has initiated the process of changing the financial industry by instigating a fork.

However, initiating a change process does not equal change within the industry, and certainly not within an industry as old and established as the financial industry. Changing such an industry requires significant and sustained effort directed by a specific strategy. My findings have shown that cryptocurrency technology promotes a two-pronged decentralisation within the financial industry, being internal and external forms of decentralisation. I argue that these two different forms, given their different natures, require two different approaches for their development. As explained in my findings, internal decentralisation is advanced by requiring more decentralized interactions with and processes around the cryptocurrency technology. External decentralisation on the other hand is advanced through demonstrating a capacity to replace middlemen and gaining acceptance and legitimacy to achieve this. As such, these two different approaches are enacted in different ways and thus have different supporting factors, ultimately influencing the financial industry differently. I will now discuss the development of both forms of decentralisation and analyse them through application of what I deem to be relevant and supporting theoretical frameworks, beginning with internal decentralisation.

5.2.2 Increasing Internal Decentralisation

Given that internal decentralisation is increased by cryptocurrency through forcing decentralisation to be incorporated in the processes around and interactions with it, the means through which it is enacting change can be explained by socio-technical theory. Sociotechnical theory argues that technology can play a significant role in constructing and/or transforming the environment and can influence the interactions of actors as well as even becoming an actor itself (Tryggested, 2005). To illustrate this, I intend to draw heavily on the work of Latour (1990), which I believe aptly explains the means through which cryptocurrency technology constructs the actions of actors around in a manner that promotes decentralisation. Cryptocurrency technology predetermines the type of acceptable approach which is a decentralised approach and only a decentralised approach. As interviewees across the board highlighted, the value in this technology lies only in its decentralisation aspect. As such, cryptocurrency technology is loaded in such a manner so as to force those who interact with it in a specific manner. Interacting with the technology forces the introduction of decentralisation to previously centralised processes as well as a review of the centralised ways of thinking previously implemented, in favour of more decentralised ways. This is therefore in line with Latour's explanation of how domination is achieved through a combination of social relations and non-human actors (1990). As the process of enrolment unfolded and developed, there is a gradual transformation of roles and identifications of those involved.

This is illustrated in my findings by Danske Bank's project with their Finish counterparties to enact a project using cryptocurrency's decentralized technology. By enrolling to this idea all parties involved had their roles redefined as boundaries between responsibilities were blurred due to the open source nature of the project. Indeed, even the identity of the process, as something owned by specific actors would naturally have been redefined to being a beast of its own which each actor could interact with. This is directly comparable with the case of the introduction of self-service technology in Britain, as illustrated by duGay (2007). In both duGay's case and the case of cryptocurrency technology, enrolment to the new situation resulted in changed behaviours which in turn led to changed roles on behalf of all actors involved as a result of new technology shaping new interactions.

Consequentially working in these partnerships with other players around this technology can lead to the development of proto-institutions. Lawrence, Hardy and Phillips (2002) propose that collaborations can instigate change in institutional fields through the creation of proto-institutions, which are new institutions that result from a collaboration amongst the parties involved and which continue to be enacted by said parties after the collaboration. It is highly possible and indeed likely, that by working together on these new project types borne from the decentralized technology that collaborating parties develop new rules of the game for how to interact and work around these projects. Given Mads' statement that Danske Bank's first implementation of the decentralized technology has "totally reshaped how that entire sector works" and Rachel's statement that working with this decentralised technology requires a "fundamental shift in thinking on the part of our clients", it can be inferred that proto-institutions will and are being developed as a result of such projects. This will arguably contribute to increasing decentralisation in the financial industry as the proto-institutions developed through these collaborations formed around specific areas of each party's overall activities will likely spill over to other activities, in particular as these projects increase in number as they are predicted to do, according to Mads. As they do so, following the logic of Lawrence, Hardy and Phillips (2002), these proto-institutions will gradually develop to full institutions as they fully develop within the individual organisations and then begin to transfer to other organisations that they work with.

As such, based on analysis of my findings, I find that internal decentralisation is increased through the technology that cryptocurrencies introduce constructing a specific path that actors are forced to follow over the course of their enrolment. In doing so, the growth and development of proto-institutions is facilitated, leading to the eventual development of industry institutions which are centred around acceptance of and support for decentralisation.

5.2.3 Increasing External Decentralisation

Given external decentralisation's definition, I argue that it is increased through establishing cryptocurrency's superiority as a technology and subsequent capacity to eliminate unnecessary

middlemen. However, in order for it to achieve this, this technology and its superiority must be accepted by consumers and earn some degree of mainstream adoption. From analysis of my findings, I find that a robust action strategy is being enacted, knowingly or unknowingly, by cryptocurrency proponents. Such a strategy entails having a specific strategic objective while allowing for the flexibility to respond to opponents' actions as well as the demands of the environment (ibid). As shown in my findings, while cryptocurrency companies have maintained their overall objective to introduce greater decentralisation to the financial industry, part of their introduction strategy has involved adapting to the responses of incumbents, as well as the overall context which demands a more moderate approach. Drawing on Hargadon and Douglas' case analysis of Edison's introduction of electric systems (2001), I will now explore how cryptocurrency technology is following a similar path.

Firstly, a robust action strategy is needed when the situation or opponents provide backlash to the innovation, which requires a response. My findings clearly show this to be the case with cryptocurrency's introduction to the financial industry, whereby two forms of resistance can be identified as per Hargadon and Douglas' definition (2001). The first is regulatory resistance, which cryptocurrency technology is clearly facing from two fronts. Firstly, it faces straight-forward regulatory challenges in terms of achieving regulated status in many geographies, with many countries, such as China, outright banning it (Damak, 2018, Bajpai, 2019). However, it is equally facing regulatory challenges due to a lack of regulations, as pointed out by many of my interviewees. Mads and Rachel highlighted that lack of regulation incited major hesitancy on behalf of incumbents to engage while, on the cryptocurrency proponent side, George, Jan and Gustav all felt regulation could eventually be a friend but it wasn't there yet, which in itself was a challenge. As such, cryptocurrency technology requires a robust action strategy that will allow it to push its objective while also responding to the regulatory challenges they face. However, it also faces the second form of resistance identified by Hargadon and Douglas, which is normative resistance (2001). This form of resistance arises from the understandings and actions of actors that constitute the context of the financial industry. For example, Edison faced normative resistance from experts in the area denouncing his electrical system as impossible (Hargadon and Douglas, 2001). Cryptocurrency technology faces equal, if not heavier,

criticisms which form resistance to its establishment as a superior technology. My findings identified that lack of education about cryptocurrency is still a major problem amongst consumers, with interviewees across the board referencing it as an issue. Equally, and likely as a result of this lack of education, misunderstanding about what cryptocurrency is remains rife, with many still interpreting cryptocurrency as a dangerous internet money for criminals. As such, cryptocurrency's introduction strategy must respond to normative resistance which shapes the environment it exists in as well as the actions of opponents. Thus, cryptocurrency's need for, and likelihood for proponents to therefore use, a robust action strategy is evident.

In order to respond to this resistance, a robust action strategy proposes that innovators must limit differentiating between the new innovation and the incumbent technology. This is because the pivotal argument of a robust action strategy is that the success of a new innovation depends on how well people understand it as well as how well they know how to respond to it. Given that people build their understandings and knowledge based on their past understandings and knowledge, it is consequentially important that new innovations take advantage of these past understandings and knowledge to grow the understanding of their innovation. Naturally, it is difficult to do this by highlighting differences of the new innovation with the older technology. Instead they can do this by wrapping their innovation in elements which are familiar to people, for example like Edison insisted on using hardware leftover from gas infrastructure when developing the electrical system (Hargadon and Douglas, 2001). As such, the extent to which cryptocurrency technology is differentiated from the traditional monetary system would need to be minimised. Despite radical proponents routinely hailing the vastly superior and radically different system, most proponents are more moderate in their approach. My findings show that proponents do highlight the benefits of a decentralized financial system, to different degrees, and point to the benefits of greater control, more efficiency and lower fees. However, like Edison only highlighting the lower cost and better technology of the electric system (Hargadon and Douglas, 2001), this is the only act of differentiation that cryptocurrencies engage in.

Aside from this, my findings suggest that cryptocurrency companies are taking measures to present themselves in a manner that is familiar to consumers and incumbents alike. They do this largely through the use of skeumorphs, which are elements of design that serve no objective function (Hargadon and Douglas, 2001). My findings present clear evidence of this as interviewees revealed how they are using the hardware and software of incumbents to integrate cryptocurrency into the processes which consumers are accustomed to. In particular, Jan stated that they have enabled cryptocurrency to be used at payment terminals through the use of incumbent payment service providers such as Wordline and Ingenico despite this hardware not actually being required for a cryptocurrency transaction. Jan cemented this when he stated that "cryptocurrencies don't need them". Additionally, the capacity to hold a cryptocurrency on a debit or credit card with Visa or Mastercard provides access to cryptocurrency and the use of tit in a manner that is familiar and understandable to consumers. By utilising these skeumorphs, cryptocurrency proponents sacrifice the opportunity to showcase the full benefits of the technology, because consumers will thus still be charged the transaction fees that cryptocurrency has been developed to eliminate. This is directly comparable with Edison's decision to only provide bulbs that lit at the same, weaker level of gas lights, despite the capacity to be brighter which Hargadon and Douglas identified as a hallmark of his robust action strategy (2001). Given the negative drawbacks of such an approach, it can be assumed that cryptocurrency proponents are pursuing this approach to increase understanding through familiarity, supporting the argument that they are actively implementing a robust action strategy.

Furthermore, as part of their robust action strategy, I find that cryptocurrency proponents are adopting a manipulation strategy in order to increase their legitimacy. This contributes to their robust action strategy by manipulating elements of the environment in specific ways to make the unfamiliar seem more familiar and understandable, by increasing their legitimacy. As per Zimmerman and Zeitz, a manipulation strategy is an approach of trying to influence the type and level of legitimacy an organization earns by changing the environment of the organization to create conformity (2002). This is done by actively engaging in activities to change the elements that contribute to legitimacy status, rather than waiting for them to adapt themselves. Zimmerman and Zeitz identify three sources of

legitimacy which are sociopolitical regulatory, sociopolitical normative and cognitive (2002), and cryptocurrency proponents can be seen to be targeting all three. My findings provide evidence for how cryptocurrency proponents are actively lobbying for changes in existing regulations and are even participating in the development of new regulations, thus tackling sources of sociopolitical regulatory legitimacy, for example with George and Mads' references to the growing presence of cryptocurrency proponents at parliamentary and regulatory meetings. They are also attempting to change perceptions of values by encouraging consumers to question the value provided by banks and financial service providers, with Mikael, for example, arguing that banks currently provide poor value to customers because they know customers have to continue using them as there is currently no alternative. This targets sources of sociopolitical normative legitimacy. Lastly, they work on sources of cognitive legitimacy by attempting to alter existing ideas of financial service models and how they should be conducted, with Gustav for example arguing that the Maker DAO cryptocurrency could in fact be described as a bank.

My findings provide many examples of the steps which cryptocurrency proponents are taking in order to influence the legitimacy they earn. One such example is of course from their partnerships and collaborations with incumbent players. Other than the above-mentioned benefits of increasing familiarity with the product by providing it through familiar technology, these collaborations also help to confer some of the legitimacy of these incumbents on to the cryptocurrency proponents (Zimmerman and Zeitz, 2002). As consumers are constrained by bounded rationality and often make quick decisions based on inferences from limited data, they will often assume that a new player that is working with a player whom they trust and view as legitimate, can also be assumed to be legitimate. This is a form of endorsement, which Zimmerman and Zeitz identify as a specific means of earning legitimacy (ibid). Another method of earning legitimacy is through positive press coverage (ibid), which cryptocurrency proponents can also be shown to be receiving from my findings, with features in established newspapers such as Børsen (Gustav, Interview). As such, cryptocurrency proponents can be proven to actively be attempting to influence and increase their legitimacy. On closer inspection, it becomes clear that the focus of cryptocurrency proponents manipulation strategy appears to be on

socionormative legitimacy. This can be explained by socionormative's direct impact on consumer's beliefs and understandings, meaning it can logically be determined to have the greatest impact on cryptocurrency's acceptance as a superior technology, the main focus of cryptocurrency's robust action strategy.

Ultimately, the manipulation strategy strengthens the impact of the robust action strategy by assisting in increasingly making the unfamiliar more familiar. The robust action strategy then allows cryptocurrency technology to build on this growing familiarity to further overall understanding of the technology, and ultimately, to achieve acceptance of its superiority as a technology. It is only with this acceptance on behalf of consumers, that cryptocurrency technology can successfully eliminate middlemen and disrupt the usual roles involved in financial industry processes. As such, a robust action strategy is clearly an important factor in promoting external decentralisation, and the above analysis proves cryptocurrency proponents' use of it. Thus, I determine that cryptocurrency technology is increasing external decentralisation through the implementation of a robust action strategy by its supporters

5.2.4 Increasing Decentralisation through Institutional Infrastructure

Ultimately, for both internal and external decentralisation, the introduction of cryptocurrency technology can be determined to be increasing decentralisation by impacting the institutional infrastructure of the financial industry, albeit through various means. In the following paragraphs, I will outline how the robust action strategy, manipulation strategy, proto-institutions and sociotechnical elements all collectively target the institutional infrastructure of the financial industry in order to instigate change.

However, it is first important to establish why cryptocurrency technology is primarily altering the institutional infrastructure as a means of enacting change, rather than immediately building new institutional infrastructure. This is particularly relevant given cryptocurrency proponents' constant critiques of much of the current institutional infrastructure within the financial industry. I argue that

this approach of altering rather than building from scratch can be explained by cryptocurrency's forking of the industry. As I have previously determined, cryptocurrency technology appears to be causing a fork of the current financial industry, as opposed to an exit to a completely new financial system. A forking approach dictates that cryptocurrency technology would not abolish all previous infrastructure, but rather alter and build on the already established infrastructure. This could also lead to changes influenced by cryptocurrency being gradual and subtle enough that the changes may not be noticed or acknowledged, leading to the flawed perception that little or no change has occurred. My findings present exactly this, whereby I find evidence of clear change in the financial industry, despite many critics of cryptocurrency technology denouncing its impact. The forking approach to enacting industry change thus appears to accurately explain the reasons for cryptocurrency proponents' focus on altering the current, rather than building new, institutional infrastructure.

One of the main ways it does this is through the implementation of a robust action strategy. It becomes apparent with a simple comparison of the definition of a robust action strategy with that of the definition of institutional infrastructure how the former could contribute to the latter. Institutional infrastructure is defined by Hinings, Logue and Zietsma as the cultural, structural and relational elements that contribute to normative, cognitive and regulative forces that bind the industry together (2017). Comparatively, robust action strategies focus on how people understand a new innovation as well as how well they understand how to use it. As such, robust action strategies clearly have a direct impact on the cognitive forces of the financial industry's institutions. From my analysis above outlining what is involved in the robust action strategy being deployed by cryptocurrency proponents, it is clear that it does this by primarily utilising structural and relational elements. It uses structural elements through the use of skeumorphs, relying on incumbent hardware and structures to present the new technology in a familiar way to make it more easily understood by incumbents and consumers. This in turn, along with presenting the technology in familiar language, impacts their relations with the technology, shaping it to be a more positive relationship as these actors become more familiar and accustomed to the technology. Ultimately, the robust action aims to familiarise incumbents and consumers with the actions and interpretations available to them when engaging with cryptocurrency

technology. Given that institutions are defined as the sets of acceptable interpretations and actions available to actors, it is clear how robust action strategy actively targets and shapes the institutional infrastructure to inflict change at the institutional level.

Furthermore, the manipulation strategy to earn legitimacy, as part of the overall robust action strategy, strengthens the robust action strategy's contribution by working directly with and involving institutional infrastructure. As previously mentioned, conferences and positive press coverage are prime sociopolitical normative sources of legitimacy. However, they are also important elements of institutional infrastructure. As such, by working with these particular elements, a manipulation strategy immediately affects the institutional infrastructure. Indeed, Hinings, Logue and Zietsma (2017) state that conferences are an important means of constructing institutional infrastructure, meaning the conferences attended and held by cryptocurrency proponents indirectly benefit legitimacy as previously previously mentioned and directly for building institutional infrastructure. Given their description of institutional infrastructure as also being "a set of actors or structures which have the role of judging, governing or organizing other actors in the field" (ibid) it can be inferred that they would also identify the press and media as a key component of institutional infrastructure as they certainly participate in judging other actors in the field. As a result, cryptocurrency technology's positive coverage in reputable outlets further contributes. Overall, a manipulation strategy aims to define what the widely acceptable practices are by actively attempting to change perceptions and judgements of institutional infrastructure to enhance their legitimacy status.

Additionally, the contribution of proto-institutions is relatively apparent. While proto-institutions don't necessarily contribute to institutional infrastructure themselves, the act of developing proto-institutions does contribute as they are younger, more immature forms of institutions. Proto-institutions grow and develop in a specific manner, from within cross-organisation collaborations, to throughout organisations industrywide (Lawrence, Hardy and Phillips, 2002). Applying this to cryptocurrency technology's permeation of the financial industry, acceptable sets of interpretations and actions are determined and developed within the partnerships and collaborations between

financial service providers (both incumbents and otherwise) arising from working with the technology introduced by cryptocurrency. As established, these sets of interpretations and actions, around acting in a more decentralized manner, may then begin to penetrate other elements of the organisations involved in the collaborations, such as departments which have not been involved. From here, these sets of interpretations and actions can be identified as proto-institutions, and if they then successfully disseminate further to other organisations within the industry, it can be deemed that an institution has been established. As such, through the collaborations they encourage, the technology of cryptocurrency facilitates and even promotes the development of proto-institutions which can lead to institutions.

Lastly, the sociotechnical element contributes to the infrastructure through the technology's active construction of ways in which actors should interact with it, redesigning the structure of technology within the industry. My findings showed that the technology introduced by cryptocurrency demands specific forms of interaction and is loaded so as to ensure that actors engage with it in a more decentralised manner. In essence, the technology then defines the set of interpretations actors can make of it and subsequently, the actions available to them. Specifically, it enforces a decentralized interpretation of the technology, leading to actors interpreting the processes around it as needing to also be decentralised. Given this interpretation that the technology and the processes it is attached to are decentralized, the implication is that the actions available should also be decentralized. And in fact, with cryptocurrency technology, it is more than just an implication, as this technology is only effective with decentralized approaches. As such, socio-technical theories explain how the technology itself both becomes part of the infrastructure, while also being part of developing the infrastructure.

5.3 Conclusion to the Analysis

In conclusion, analysis of my findings has revealed that the introduction of cryptocurrencies and cryptocurrency technology to the financial industry has resulted in increased overall decentralisation. This was achieved by increasing external and internal decentralisation of incumbents, increasing the external decentralisation of consumers, and interestingly, by decreasing the internal and external

decentralisation of cryptocurrency companies. Internal decentralisation was found to be generally increased due to sociotechnical elements of cryptocurrency technology's design and the development of proto-institutions. External decentralisation, on the other hand, was found to increase overall due to the implementation of robust action and manipulation strategies by cryptocurrency proponents. Interestingly, the robust action and manipulation strategies were deemed to be the reason for the decreased decentralisation of cryptocurrency companies and proponents, but this sacrifice was required to achieve greater overall decentralisation. Deeper analysis of my findings then provided explanations as to how these four elements facilitated this change to the level of decentralisation within the financial industry. Ultimately, I found that all four elements targeted the industry at an institutional level, allowing for a subtle, gradual transformation. Deeper analysis then revealed that these four elements facilitated this change in the level of decentralisation within the financial industry by collectively working on and impacting the institutional infrastructure.

CHAPTER 6: CONCLUDING DISCUSSION

My goal in this thesis has been to explore how cryptocurrency technology has impacted the level of decentralisation within the financial industry. Having outlined my findings on this subject and subsequently having analysed these findings, I will now present my conclusions to my research question so as to fully and completely answer my research question:

How has the introduction of cryptocurrency technology impacted the level of decentralisation within the financial industry?

As outlined previously, I tackled this question by first presenting findings and analysis to answer whether the introduction of cryptocurrency technology resulted in an increase of decentralisation within the financial industry, whereby I found that it caused an overall increase in decentralisation. I then presented my analysis to explain how resulting changes in the level of decentralisation were facilitated. I will now use the result of these analyses to answer the research question.

6.1 Conclusion to my Research Question

6.1.1 *Has the introduction of cryptocurrency technology increased or decreased the level of decentralisation within the financial industry?*

In order to answer this question, it was necessary to define decentralisation. Through the course of my research and interviews, it became clear that the decentralisation which cryptocurrency proponents were pursuing was multi-faceted. They sought both the removal of unnecessary and sometimes problematic middlemen from the industry, but it also sought more decentralised approaches to projects within industry players. As such, it became clear that the overall decentralisation being referred to stemmed from two sub-forms. I deemed these two sub-forms of decentralisation as internal and external decentralisation. External decentralisation referred to the number of actors with control and that were involved in decision making processes across the industry, while internal decentralisation refers to the level of decentralisation within industry players. This finding was vital for framing my analysis of this question, broadening the scope of my analysis to include analysis of internal behaviour of industry behaviours rather than just examining the success of cryptocurrency technology in overthrowing industry players.

Having framed the scope of my analysis, I determined that the overall level of decentralisation within the financial industry has increased as a direct consequence of the introduction of cryptocurrency technology. This is as a result of increased internal decentralisation and willingness for external decentralisation identified amongst incumbent players. Internal decentralisation was increased through the design of the technology which necessitates more decentralised approaches and interactions with it, as explained by sociotechnical theory. Furthermore, the normalisation of these new approaches with greater decentralisation occurs through the development of proto-institutions, which have the capacity to disseminate further throughout the organisation and then throughout the industry to become institutions. External decentralisation and willingness for it were increased through the adoption of robust action and manipulation strategies by cryptocurrency supporters, which increased consumer and incumbents familiarity and thus acceptance of the technology by cloaking it familiar

elements such as language or within other technology, or by manipulating the environment so that the unfamiliar becomes familiar. Interestingly, in achieving this overall increase in the level of decentralisation required a decrease in internal and external decentralisation on behalf of cryptocurrency proponents. This presents an interesting result, as in order to achieve their objective, cryptocurrency proponents have had to partially sacrifice exactly that which they are pursuing. However, as outlined in my findings and analysis, this was necessary as increasing decentralisation, whether external or internal, within the financial industry is no small feat, and as such, in order to achieve success, cryptocurrency proponents were forced to adapt their objectives.

Ultimately, this sacrifice appears to have been worth it, as I determine that the introduction of cryptocurrency technology has successfully increased the level of decentralisation within the financial industry as a result of the sociotechnical elements, development of proto-institutions and the adoption of a robust action and manipulation strategy.

6.1.2 *How has the increase in decentralisation been facilitated?*

Having determined that the introduction of cryptocurrency technology increased the level of decentralisation within the financial industry, I further determined that this was achieved as a result of the combined impact of strategies targeting both subsets of decentralisation. These strategies collectively affected the institutional infrastructure to such a degree as to instigate perceivable change in the overall industry.

First, internal decentralisation was influenced by the design of the technology which necessitates the development of proto-institutions. As outlined in my findings and analysis, cryptocurrency technology can only be approached in a decentralised manner and as such, using sociotechnical terminology, it is loaded so as to pre-determine the interaction of actors with it. By requiring a decentralised approach to interact with it, the technology immediately begins to increase the level of internal decentralisation. Furthermore, applying the theory of proto-institutions, it becomes clear how these predetermined interactions can further develop to have greater impact throughout the industry as a whole. Through

normalising decentralised behaviours within smaller collaborations, acceptance and normalisation of this behaviour can begin to spread throughout the entire organisation and eventually across organisations. In this sense, what starts as smaller internal decentralisation within specific groups can develop to full internal decentralisation, vastly increasing both the internal decentralisation present within organisations and the number of organisations exhibiting internal decentralisations.

Second, external decentralisation was increased by cryptocurrency proponents actively working to improve the reputation and perception of cryptocurrency technology, so as to increase acceptance of its claimed ability to negate the need the industry's middlemen. This involved implementing a strategy to increase legitimacy as part of an overall robust action strategy. My findings and analysis demonstrate that this strategy attempts to increase the familiarity of incumbent players by manipulating their past understandings and knowledge of the industry. Collectively, the results of agendas towards internal and external decentralisation directly impact the institutional infrastructure of the financial industry. As outlined in my findings, both agendas contribute to the acceptable set of interpretations and actions available, as per Hargadon and Douglas' definition of institutions. The strategy towards influencing internal decentralisation directly impacts the set of actions available by predetermining the acceptable interactions, as well as impacting the acceptable set of interpretations by contributing to normalising decentralised interpretations of processes and technologies. The strategy to influence external decentralisation directly involves identified elements of institutions such as regulation, informal governance bodies such as consortiums and conferences, as well as the general beliefs and interpretations that bind an industry together such as the perception of cryptocurrency. Each of these elements were directly involved and impacted as part of the manipulation strategy and overall robust action strategy.

Ultimately the individual strategies that cryptocurrency proponents deploy to influence each form of decentralisation have a combined impact on the institutional infrastructure that is too great to not result in a lasting a change in the industry, manifesting in an increased level of decentralisation. In conclusion, cryptocurrency achieves this increased level of decentralisation in the financial industry

through persistent targeting of strategies towards the institutional infrastructure. The result is that cryptocurrency technology instigated changes from within industry players and also in the environment around these players to equal one large industry change.

6.2 Discussion

As discussed in my findings, at the introduction of cryptocurrency, many, if not most, had little faith in this technology's ability to disrupt the financial industry. Despite the changes in attitude and perception on behalf of incumbents identified in my findings, it could be argued that these changes were overly optimistic interpretations of what is happening in the industry as my research was limited to interviewees who had greater exposure than most to this technology. It could therefore be argued that their perceptions of the technology and indeed, their predictions for its future may be exaggerated because they could be biased due to their proximity to the technology. For example, at the time of writing, Bitcoin's market cap is approximately $123 billion, a mere 0.4% of the US Dollar's $30 trillion market cap. Many critics argue that Bitcoin and other cryptocurrencies failure to increase their market presence in the 10 years since their introduction proves that they have had little real impact outside of their own cryptocurrency world. Indeed, Senner and Sornette (2019) argue that cryptocurrencies are an inferior form of money and so their use-cases and thus impact on the real world falls significantly short of their expectations (ibid). This opinion is seconded by Jon Danielsson, Director of London School of Economics, who also argues that cryptocurrencies are a complicated and more inferior form of money (Danielsson, 2018).

However, while I acknowledge that there may be some truth in critics argument that cryptocurrency currently is not performing at a level where it can provide the level of impact originally envisioned by it's supporters, I find that this particular critique is based on a false assumption. These arguments seem to assume that cryptocurrency will remain at its current level of development and has no opportunity to develop and respond to critiques about its performance. However, this appears to be an unfounded assumption, as my interviewees referenced the need for the continuous fine tuning of the technology as well as the need for better infrastructure. I therefore argue that this critique is irrelevant to my

findings and analysis. Furthermore, while I acknowledge that my interviewees may have been slightly biased about the importance and presence of cryptocurrency technology based on their proximity to it, it is this very proximity that I believe validates their ability to most accurately discuss the impact of cryptocurrency technology and it's future. Danielsson himself conceded that he struggled to fully comprehend exactly how cryptocurrency worked when presenting his critique of the technology (2018). Therefore, I believe that my interviewing only of interviewees working directly with the technology has ameliorated my research rather than disadvantaged it. Ultimately, I feel that my research has appropriately explored the actual impact of cryptocurrency, presenting findings that as closely reflect the real-world situation as possible, given my limited time and research sample size.

Another point worth noting, is that given my current location in and connections primarily within Europe, this research primarily presents a Western World view of the impact of cryptocurrency technology. This is evident in my analysis, where I determined that the motivations for increasing the level of decentralisation was only fuelled by two of the three main motivations for decentralisation identified by scholars such as Maurer, Nelms and Swartz (2013). I found that the motivation to increase financial control played little to no role in inciting consumers and incumbent players alike to pursue increased decentralisation. However, George, Colin, Jan and Mikael all pointed to emerging economies and countries such as Argentina and Venezuela as being places where this motivation was much stronger. George particularly emphasised that much of the global current financial system was built with westerners in mind and thus failed to take into account the differing needs of other cultures and economies. Interestingly, countries with troubled economies appear to be the locations where cryptocurrency technology has had the most success in terms of usage. Mikael described how when he went to Argentina a few years ago, it was easier for him to use and spend his cryptocurrency than for his friend to use their credit card or even the local currency. An article from Forbes also outlines the developing presence of cryptocurrencies within troubled economies (Chambers, 2019). As such, the lack of this motivation identified in my research does not prove that scholars such as Maurer, Nelms and Swartz (2013) have made incorrect claims about the prominence of this motivation. Rather, I find that the power of these different motivations depends on the context of the economy and financial

system of each country. However, given that cryptocurrency's progress in these troubled economies reflects a development of a more digital metalism nature, I did not further elaborate on this aspect of cryptocurrency's development given my decision to focus on the infrastructural mutualism perspective.

Additionally, it has not escaped my attention that many incumbent players are still largely engaging with cryptocurrency technology in a manner that mostly allows them to continue behaving in the centralised manner they are accustomed to. This could suggest that cryptocurrency technology's promotion of decentralisation within the financial industry is less than I suggest based on my findings. For example, although there has been an increase in blockchain projects and willingness to collaborate amongst incumbents, they are still engaging in private versions of this technology rather than the fully public and fully decentralised versions that it was intended for. Furthermore, the increasing popularity of the idea for governments to introduce state backed decentralised currencies (SBDCs) can be seen as another example of centralised parties taking this decentralised technology and only partially implementing it in its intended use case. In the example of SBDCs, power and control over the monetary system still remains in the hands of the same incumbent players as always. However, in response, I point to my findings that cryptocurrency proponents have had to adjust their initial objectives to achieve full decentralisation and accept that the outcome will most likely be a system with less centralisation instead. Part of this involves accepting that incumbents likely won't use the technology exactly as intended. As such, the fact that evidence suggests that cryptocurrency has not achieved its full goal of having incumbents interact with its technology in a fully decentralised manner does not lessen my findings. This is based on two arguments.

Firstly, my interviewees emphasised that while many incumbents are attempting to engage with the technology in a centralised manner, they can generally be said to be eventually coming to the conclusion that applying a centralised approach to the technology is ineffective. Therefore, this approach of using the technology in a centralised manner should be seen as the first step in their journey of using this technology, rather than the final outcome of their introduction of cryptocurrency technology. Secondly, my findings prove that despite not reaching their overall goal of introducing full

decentralisation, cryptocurrency technology has made progress towards increasing decentralisation. The mere fact that incumbents engage with this technology at all, regardless if in a more centralised manner than intended, is proof of this. I argue that critiquing cryptocurrency for not having fully fulfilled its initial objective, rather than acknowledging its progress thus far, is a rigid and unhelpful view that does little to add to the discussion around this technology, as it refuses to acknowledge that progress is an iterative process with many milestones along the way. Therefore, I find that rather than being a legitimate observation of a failure of cryptocurrency's introduction of increased decentralisation, the critique that many incumbents are using the technology in a centralised manner, is rather merely an inadvertent observation of part of the progress cryptocurrency has made.

6.3 Implications for Further Research

This thesis has focused on analysing the impact of cryptocurrency technology from the perspective of institutional theory. To this end, while I found that many sources within institutional theory identify actors as an important part of institutional infrastructure, I failed to find theories that acknowledge how institutional infrastructure can be developed from within these actors, namely organisations, aside from Lawrence, Hardy and Philip's theory on proto-institutions (2002). This work makes impressive contributions in this area, but my findings prove there is a need for further exploration of this branch of institutional theory as they show that the development of internal decentralisation had an impact on institutional infrastructure. In regard to additional research, I believe there are several ways my research could be extended and/or elaborated on. Firstly, as referenced above, I have chosen to only explore the impact of cryptocurrency technology from an infrastructural mutualism perspective which has led to the exclusion of some interesting developments of cryptocurrency. As such, it could be extremely interesting to further explore the impact of cryptocurrency from a digital metalism perspective instead, focusing on the contribution cryptocurrency has made to increased levels of financial control. Alternatively, given the innovative nature of this technology, an additional approach could be to analyse cryptocurrency from an innovation theory perspective, in particular how it is attempting to establish decentralised finance as the new standard within the financial industry and could thus be seen to be embarking on a standards war with incumbents.

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APPENDIX

Appendix 1a: Questions for Jan (DASH)

1. How have incumbents' actions changed since the introduction of blockchain and cryptocurrency to the finance industry?

2. What is the perception of the feasability of decentralisation in the financial industry? Is it feasible? Why/Why not?

3. What are your thoughts in general on the extent to which crypto is contributing to decentralisation in the financial industry?

4. Is cryptocurrency a mandatory part of progressing decentralisation? Is it enough that people have embraced the thinking behind it?

5. Is it feasible that cryptocurrencys become the main part of the financial industry?

6. Is decentralisation being progressed by other things e.g societal trends or technology?

7. How would incumbents fit into a decentralised financial system?

8. What changes have you perceived as a result of collaborating with cryptos?

9. What were the benefits/disadvantages of collaborating or not with cryptos?

10. Who should be/is making the accommodations to who within the industry?

11. What are important characteristics of those progressing towards decentralisation the most?

Appendix 1b: Questions for Anon 1

1. Could you give me a background on your organisation's perspective on decentralisation within the financial industry?

2. How do you envision it playing out, will there be full on decentralisation or a hybrid?

3. From my research, you seem like someone who is involved in a lot of different businesses and industries. What is it about cryptocurrency that makes you think it has potential?

4. You also sit on the Board for the Chamber of Commerce. Maybe could you shed a little light on the perspective of that side of the market (i.e. more regulatory) on cryptocurrency and the role it could and should play in the market?

5. What are the main obstacles to decentralisation? Are there any supporting forces other than cryptocurrencies?

6. If all obstacles were removed and cryptocurrency was allowed to run its course and realise its true potential, how do you think the financial industry would look? What would be the role of current players? Would some players be removed? Would new ones emerge?

7. To what extent do you think we will see decentralisation in the financial industry in the coming future?

8. Given the main inspiration behind crypto was to develop a decentralised currency, what are your thoughts on the emergence of centralisation within the crypto industry?

9. What are the resulting changes you perceive from having collaborated with incumbents? Do you see any changes in how incumbent players are acting since the introduction of crypto?

10. What is it specifically about your organisation that you feel contributes to decentralisation?
    a) Consensus mechanism?
    b) Method of engaging with the financial industry?
    c) Technological superiority?

Appendix 1c: Questions for Lidia (Monolith Bank)

1. Could you give me a background on Monolith's perspective on decentralisation within the financial industry?

2. How do you envision it playing out, will there be full on decentralisation or a hybrid?

3. How does your banking service differ from traditional banking services? Why does a decentralised industry need a banking player like Monolith?

4. If your ideal decentralised situation was realised, how do you see the role of a bank evolving in comparison to what banks are doing now? What do you see the role of crypto being in this scenario?

5. What is it that makes you think that decentralisation is so feasible? What are the (other) contributing factors? What are the main obstacles?

6. Given the main thinking behind crypto is a push for decentralisation, do you think cryptocurrency will actually lead to greater decentralisation, or rather simply replace the main players in the current centralised financial industry, such as you guys?

7. Do you see the industry having changed in any way?

8. What are the resulting changes of the introduction of your service? Do you think it is influencing people's behaviour in any way, perhaps pushing more towards a decentralised industry?

9. What are your thoughts on your current environment? We see Switzerland being very progressive in this area, how do you feel the UK and other places compare? Do you think the more progressive regulation has led to different consumer behaviour or are UK customers equally as eager for decentralisation?

Appendix 1d: Questions for Anon 2 (Chainalysis)

1. Could you give me a background on Chainalysis' perspective on decentralisation within the financial industry?

2. To what extent do you think we will see decentralisation in the financial industry in the coming future? How do you envision it playing out, will there be full on decentralisation or a hybrid?

3. Chainalysis supports both blockchain and crypto, whereas a lot of people believe crypto has seen its day. What do you see as the role of cryptocurrency now and into the future?

4. You guys also obviously work heavily with market players. Can you shed some light about their perspective on cryptos and decentralisation?

5. Do you see any changes in how incumbent players are acting since the introduction of crypto?

6. Given the main inspiration behind crypto was to develop a decentralised currency, what are your thoughts on the emergence of centralisation within the crypto industry?

7. If all obstacles were removed and cryptocurrency was allowed to run its course and realise its true potential, how do you think the financial industry would look? What would be the role of current players? Would some players be removed? Would new ones emerge?

8. What are the main obstacles to decentralisation? Are there any supporting forces other than cryptocurrencies?

9. In your opinion, what is the best approach for cryptos to encourage adoption and thus DeFi?

Appendix 1e: Questions for Mads (Danske Bank)

1. Could you give me a background on Danske Bank's perspective on decentralisation within the financial industry?

2. How do you envision it playing out, will there be full on decentralisation or a hybrid?

3. Given the introduction of all this new technology, how do you see the future of the financial industry evolving over the next 5,10 years? What would the role of current players be, like Danske Bank and what would the role of cryptos and deFi be?

4. What is it that makes you think that decentralisation isn't feasible? What are the (other) contributing factors? What are the main obstacles?

5. What is Danske Bank's opinion on people's argument that there is a need for decentralisation? Do they believe people can be served better with centralisation? Do they acknowledge any failings of centralisation?

6. How is Danske Bank currently working with emerging players and technology in the industry? Why should they work with you?

7. Do you see any changes in how Danske Bank since these new technologies emerged?

Appendix 1f: Questions for Mikael Bondum (Bitcoin Suisse)

1. Could you give me a brief background on how Bitcoin Suisse was part of pioneering the crypto ecosystem?

2. Could you give me a background on Bitcoin Suisse's perspective on decentralisation within the financial industry? Is it needed?

3. How does Bitcoin Suisse see the role of current and newer players in the emerging financial industry?

4. How does Bitcoin Suisse differ from traditional players? What would happen if traditional banks started to offer more crypto services?

5. Bitcoin Suisse works with a lot of different players within the industry. How do you see these players changing since the introduction of crypto?

6. Do you feel cryptocurrency has contributed to decentralisation in the industry, and if yes, in what ways?

Appendix 1g: Questions for Gustav (MakerDAO)

1. Could you give me a background on MakerDAO's perspective on decentralisation within the financial industry?

2. How do you envision it playing out, will there be full on decentralisation or a hybrid?

3. To what extent do you think we will see decentralisation in the financial industry in the coming future?

4. What are the main obstacles to decentralisation? Are there any supporting forces other than cryptocurrencies?

5. What changes do you feel cryptocurrency has introduced in the financial industry?

6. If all obstacles were removed and cryptocurrency was allowed to run its course and realise its true potential, how do you think the financial industry would look? What would be the role of current players? Would some players be removed? Would new ones emerge?

7. Given the main inspiration behind crypto was to develop a decentralised currency, what are your thoughts on the emergence of centralisation within the crypto industry?

8. How is MakerDAO currently working with incumbent players in the industry? Why should they work with you?

9. What are the resulting changes you perceive from having collaborated with incumbents? Do you see any changes in how incumbent players are acting since the introduction of crypto?

10. What is it specifically about MakerDAO and cryptocurrencies that you feel contributes to decentralisation?

Appendix 1h: Questions for Rachel

1. What type of projects have you implemented? I would also like to hear more about your work with developing the identity project with Bank of Ireland and AIB.

2. Who are the types of clients Deloitte is working with when implementing this technology (you of course do not have to name names)

3. Is there any perceived difference in the approach of these clients versus other clients not working with blockchain? (e.g. are they more innovative/younger/in less regulated industries)

4. Do companies have to change their approaches and perspectives when engaging with blockchain?

5. Why are most financial service companies (in your opinion) only engaging with the blockchain aspect, and not the full cryptocurrency technology?