



Cui, Sichang (2024) *The regulation of Green ICO in the UK and China*.
PhD thesis.

<https://theses.gla.ac.uk/84127/>

Copyright and moral rights for this work are retained by the author

A copy can be downloaded for personal non-commercial research or study,
without prior permission or charge

This work cannot be reproduced or quoted extensively from without first
obtaining permission from the author

The content must not be changed in any way or sold commercially in any
format or medium without the formal permission of the author

When referring to this work, full bibliographic details including the author,
title, awarding institution and date of the thesis must be given

Enlighten: Theses

<https://theses.gla.ac.uk/>
research-enlighten@glasgow.ac.uk

The regulation of Green ICO in the UK and China

Sichang Cui

**Submitted in fulfilment of the requirements of the
Degree of Philosophy**

**School of Law, College of Social Sciences
University of Glasgow
September 2023**

Abstract

This dissertation examines the intersection of Green Finance and Initial Coin Offerings (ICOs), with a particular emphasis on their regulatory landscapes in the UK and China. Amidst the global rise of sustainable financial practices, the innovative realm of FinTech has brought forth ICOs as a revolutionary fundraising mechanism. This research juxtaposes the trajectories of Green Finance and ICOs in two economically significant nations: the UK, known for its progressive financial regulations, and China, marked by its distinctive regulatory approach and vast market potential. Through a systematic comparative analysis, the study explores the advantages, challenges, and risks inherent in the amalgamation of Green Finance and ICOs. Subsequent chapters delve deep into the respective legal and regulatory frameworks of the UK and China, spotlighting areas of convergence, divergence, and potential cross-pollination. The research uncovers a spectrum of insights, from the intricacies of Greenwashing in the UK to China's unique "Yue Tan" regulatory perspective. Recommendations are proffered for both nations, reflecting a synthesis of shared learnings and country-specific nuances. The findings contribute to the burgeoning discourse on sustainable finance, offering policy implications, industry directives, and avenues for future research in an increasingly digitalized and eco-conscious global financial landscape.

Acknowledgement

I am profoundly grateful to have reached this milestone, and I owe immense gratitude to those who have supported me throughout this remarkable journey leading to the completion of my Ph.D. dissertation.

Firstly, I extend my heartfelt thanks to the University of Glasgow for providing an enriching and stimulating academic environment, which has been instrumental in my personal and professional development.

I am indebted to my supervisors, Dr. Javier Solana, Dr. Ramona Blanes, Professor Iain MacNeil, and Professor George Walker, for their invaluable guidance, unwavering support, and insightful feedback. Their wealth of knowledge and dedication have been pivotal in shaping my research and fostering my intellectual growth.

I want to express my sincere appreciation to my incredible roommates from 508 and 408, who have shared this four-year journey with me. Their camaraderie, encouragement, and shared moments of joy and challenge have made this journey more rewarding and memorable.

My heartfelt thanks go to my parents, whose love, sacrifices, and constant encouragement have been my pillars of strength. Their unwavering belief in me has been a source of motivation and resilience, and I dedicate this achievement to them.

To my dear girlfriend, Xuan Xuan Yu, thank you for your love, understanding, and endless support. Your presence has brought joy and light into my life, and your encouragement has been a constant source of strength.

Lastly, I am grateful to my friends, colleagues, and everyone who has contributed, directly or indirectly, to my Ph.D. journey. Your support has been invaluable, and I am thankful for the inspiration and positive energy you have provided. This journey has been an amalgamation of learning, growth, and cherished experiences, and I am deeply thankful to all who have participated in it.

Authors Declaration

“I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.”

Printed Name: Sichang Cui

Signature: Sichang Cui

Table of Contents

Introduction	9
Research Gap	11
Objective and Significance of the Dissertation	12
Research Questions.....	13
Methodology Overview	14
Dissertation Structure.....	15
Chapter 1 Green Finance	16
1.Overview of Green Finance.....	16
2. Introduction of Green Finance in China and UK.....	17
2.1 Green Finance in China	17
2.2 Green Finance in the UK	19
2.3 Green Finance Markets.....	21
2.4 What are the current challenges?	23
3. Summary.....	31
Chapter 2 FinTech and ICO opportunity	31
1. Introduction	31
2. The definition of FinTech.....	32
3.Two approaches to map FinTech.....	34
3.1 Market function.....	35
3.2 Market Technology Approach	47
4.FinTech advantages and disadvantages.....	51
4.1 Technology perspective	51
4.2 Business model perspective.....	53
4.3 Users and stakeholder's perspective.....	54
4.4 Globalization perspective	55
4.5 Governance and regulation perspective.....	56
5. ICO opportunities	57

5.1 The underlying technology of ICO and related debates.....	57
5.2 ICO structures.....	63
5.3 ICO financing process.....	64
5.4 The differences between ICOs and IPOs.....	69
6. Summary.....	74
Chapter 3 Green Finance and ICO risks	75
1. Apply ICO in the Green Finance.....	75
1.1 The advantages for ICO applying in Green Finance.....	75
2. Risks in Green ICOs	80
2.1 Risks inherent to ICOs.....	80
2.2 Greenwashing (risks inherent to Green Finance).....	84
3. Summary.....	87
Chapter 4 Law, Regulation, and ICO.....	89
1. Law and regulation.....	89
1.1 Law, Regulation, and innovation.....	92
1.2 Law and regulation follow the FinTech	93
1.3 Self-regulation and technology driven market.....	96
2. Financial regulation and FinTech	98
2.1 The definition of financial regulation and its objectives.....	98
2.2 Different types of financial services regulation.....	104
2.3 FinTech self-regulation in China and the U.K.	106
3. Why does FinTech need regulation?	108
3.1 The p2p loan in China.....	110
3.2 The p2p loan in the U.K.....	112
4. The ICO regulation	115
4.1 The necessity of ICO regulation	116
4.2 ICO regulation and Market Failure	120
Chapter 5 The regulation of Green ICOs in UK	123

1. ICO regulation architecture in UK.....	123
1.1 The regulatory structure and stance of the UK.....	123
2. The regulation of security tokens.....	124
2.1 The regulatory framework on security tokens.....	124
2.2 Other regulation on security tokens.....	128
2.3 The IPO prospectus regime and ICO Whitepaper.....	130
3. The regulation of Greenwashing in the UK.....	131
3.1 The Green Claim Code.....	131
3.2 Sustainability Disclosure Requirements (SDR) and investment labels.....	133
3.3 The regulation for misleading action.....	135
3.4 The regulation for misleading omissions.....	139
4. The analysis of UK's regulation on Green ICO.....	140
4.1 Potential problems for the U.K.'s ICOs regulation.....	140
4.2 The potential problems for Greenwashing regulation.....	143
4.3 The effectiveness of Greenwashing regulation in UK.....	146
5.Recommendation.....	147
5.1 The choice of regulatory model.....	147
5.2 Regulatory direction and choices.....	150
5.3 Setting standards for white papers and green projects.....	156
5.4 Establish a third-party dynamic rating mechanism.....	163
5.5 Provide more legislation suitable for Green ICO.....	165
5.6 Establish well-defined and mandatory green regulation.....	166
6. Summary.....	168
Chapter 6 The regulation of Green ICOs in China.....	170
1. The financial regulatory architecture of China.....	170
1.1. Central regulatory body.....	170
1.2 Vertical regulatory relationship.....	172
2. The Chinese characteristic regulatory approach "Yue Tan".....	174

3. ICO regulation in China	176
3.1 The ban on ICOs.....	176
3.2 The rationales behind the ban	178
4. Critical analysis of the Chinese regulatory framework.....	187
4.1 The benefits for ICO prohibition	187
4.2 The potential problems for ICO prohibition.....	188
4.3 Discussion on China's ban on ICO.....	190
5. Recommendation.....	191
5.1 Regulatory Sandbox for China.....	192
5.2 Discussion for China's sandbox design	195
5.3 Experience from Yue Tan.....	197
5.4 Experience from the UK.....	197
6. Summary.....	199
Conclusion	200

Introduction

The Global Rise of Green Finance

In recent decades, the world has witnessed an unprecedented shift in its financial paradigm, particularly in its response to looming environmental challenges. Green Finance, often regarded as a sub-discipline of environmental economics, has come to the forefront of this transition. By definition, Green Finance refers to the financing of investments that not only provide environmental benefits but also aim to achieve sustainable development objectives.¹ The importance of Green Finance is underscored by the pressing need to mitigate the adverse effects of climate change and facilitate the transition to a low-carbon, resilient economy. The Intergovernmental Panel on Climate Change (IPCC) has persistently warned of the impending environmental crises, thereby emphasising the essential role of Green Finance in bridging the funding gap for climate initiatives.²

The genesis of Green Finance can be traced back to the late 20th century when the global community started to recognise the intrinsic link between financial markets and environmental sustainability. However, it was Article 9 of the 2015 Paris Agreement that acted as a catalyst, urging nations to mobilise their financial systems towards sustainable economic goals.³ Since then, a myriad of green bonds, green loans, and sustainable investment portfolios have proliferated, reflecting a burgeoning interest from both public and private sector entities.

FinTech Revolution

The term 'Financial Technology' or 'FinTech' encapsulates the symbiotic convergence of finance and technology. Over the past decade, FinTech has rapidly evolved from a niche industry to a mainstream global phenomenon, reshaping the financial sector landscape. Historically, financial

¹ Nannette Lindenberg, 'Definition of Green Finance' (2014)

² Projected Climate Change, 'Global warming of 1.5° C' (2018) World Meteorological Organization: Geneva, Switzerland

³ UNFCCC, The Paris Agreement (United Nations Framework Convention on Climate Change, 2015).

services were the preserve of monolithic institutions, characterized by bricks-and-mortar establishments, extensive regulatory oversight, and seemingly impenetrable operational practices. The turn of the 21st century, however, marked the inception of a transformative era. Advances in technology—most notably the ubiquity of the internet, the proliferation of mobile devices, and developments in data analytics—catalysed the FinTech movement.

One of the primary drivers behind the FinTech revolution has been the democratisation of financial services. Digital platforms now enable instantaneous cross-border transactions, facilitate mobile banking, and offer robo-advisory services, reaching segments of the population previously underserved by conventional banking systems.⁴ Traditional financial products and services underwent significant re-imagining. Peer-to-peer (P2P) lending platforms challenged the hegemony of traditional lending institutions, cryptocurrencies like Bitcoin questioned the very nature of money, and algorithm-driven investment platforms disrupted conventional asset management strategies.⁵

While FinTech introduced unparalleled efficiencies and access, it also posed unique regulatory challenges. The decentralized and often borderless nature of many FinTech platforms made them hard to oversee using traditional regulatory frameworks. However, this also fostered a climate of regulatory innovation, with concepts like 'regulatory sandboxes' being implemented to nurture FinTech advancements in controlled environments.⁶ The FinTech revolution represents a paradigm shift in the financial sector. Through technological innovations and a renewed focus on customer-centric solutions, FinTech has irrevocably altered the trajectory of global finance, heralding a new era of inclusion, efficiency, and evolution.

Initial Coin Offerings (ICOs)

Initial Coin Offerings, commonly abbreviated as ICOs, signify an innovative financial mechanism that has garnered significant attention in recent years. They predominantly serve as

⁴ L. Zavolokina, M. Dolata, and G. Schwabe, 'FinTech – What's in a Name?', *Journal of Financial Transformation*, 44 (2016), pp. 122-127.

⁵ Douglas W Arner, Janos Barberis and Ross P Buckley, 'The evolution of FinTech: A new post-crisis paradigm' (2015) 47 *Geo J Int'l L* 1271

⁶ Douglas W Arner, Janos Nathan Barberis and Ross P Buckley, 'The emergence of RegTech 2.0: From know your customer to know your data' (2016)

a fundraising tool for projects, primarily within the blockchain and cryptocurrency realms. ICOs originated as a decentralised method of fundraising wherein new cryptocurrency projects would sell a portion of their newly minted tokens to early supporters and investors in exchange for more established cryptocurrencies, predominantly Bitcoin and Ethereum.⁷ This bypasses traditional intermediaries such as venture capitalists or banks, thus potentially accelerating the fundraising process.

ICO has many advantages, for example, projects can attract investments from across the globe, unhindered by geographical limitations.⁸ Besides, tokens can potentially be traded on cryptocurrency exchanges, offering liquidity to investors. However, for ICO regulation, there are some controversies and challenges. The first is regulatory ambiguity: ICOs often fall into regulatory grey areas due to their novel nature. While some countries like the UK have embraced them, others like China have imposed strict regulations or outright bans.⁹ The scams and fraudulent projects also make ICO highly controversial. The lack of oversight and due diligence has led to numerous scams, with promoters absconding with investor funds. In addition, token prices can be highly volatile, leading to significant financial losses for investors. The market volatility makes the ICO market unstable and full of speculators. While ICOs have faced scepticism due to the associated risks, they remain a potent symbol of how blockchain technology can disrupt traditional financial mechanisms. With evolving regulatory landscapes and the emergence of more refined and transparent ICO practices, such as Security Token Offerings (STOs), the potential for this fundraising mechanism remains vast.

Research Gap

As both Green Finance and ICOs emerged as prominent topics within their respective domains, their intersection is an example of how contemporary financial mechanisms can be leveraged to support sustainable and environmentally friendly projects. Green Finance pertains to the financial investment flowing into sustainable development projects and initiatives that have

⁷ Saman Adhami, Giancarlo Giudici and Stefano Martinazzi, 'Why do businesses go crypto? An empirical analysis of initial coin offerings' (2018) 100 *Journal of Economics and Business* 64

⁸ Christian Fisch, 'Initial coin offerings (ICOs) to finance new ventures' (2019) 34 *Journal of Business Venturing*

1

⁹ Gold Rush, 'It's a Scam, it's a Bubble, it's a Super Challenge for Regulators' Kann abgerufen

environmental benefits.¹⁰ It serves as a bridge to channel requisite funds into climate mitigation and adaptation projects. ICOs, on the other hand, provide a decentralised fundraising mechanism, particularly suitable for startups and projects operating on blockchain technology.¹¹ Some projects have already leveraged ICOs for green initiatives. For instance, solar energy projects might raise capital through ICOs and provide token holders with a share of the generated solar power, effectively tokenising green energy. However, ICOs in many jurisdictions are still in regulatory grey areas. When applied in Green Finance, which itself demands transparency and adherence to standards, the regulatory complexities can be daunting.¹² Also, with the rise of interest in sustainable investments, there's an increased risk of "Greenwashing", where projects may falsely claim environmental benefits to attract funding.

Objective and Significance of the Dissertation

The primary objective of this dissertation is to explore the interface between Green Finance and ICOs. To understand the characteristics and mechanisms of Green Finance and ICOs individually, thereby contextualising their convergence. To discern how ICOs can act as a vehicle to mobilise resources for Green Finance initiatives, facilitating sustainable and environmentally conducive projects. To elucidate potential roadblocks, especially regulatory and ethical (like greenwashing), that might hinder the effective merger of ICOs and Green Finance. To offer strategic insights and guidelines that can further promote and streamline the adoption of ICOs in Green Finance, ensuring credibility, transparency, and tangible environmental impacts.

This dissertation can fill the current knowledge gaps. Given the nascent stage of both ICOs and their application in Green Finance, this dissertation will contribute to an under-researched area, bridging the knowledge chasm. Also, with a comprehensive understanding of the challenges, particularly in the regulatory domain, this research can inform policymakers to design robust

¹⁰ Zongwei Luo, 'Green Finance and Sustainability: Environmentally-Aware Business' (2011)

¹¹ Adhami, Giudici and Martinazzi, 'Why do businesses go crypto? An empirical analysis of initial coin offerings'

¹² Dirk A Zetzsche and others, 'The ICO Gold Rush: It's a scam, it's a bubble, it's a super challenge for regulators' (2017) University of Luxembourg Law Working Paper 17

frameworks that cater to the evolving landscape of Green Finance and ICOs. By delineating the intricacies of conducting green ICOs, the study can act as a guidebook for potential startups and innovators in the green tech domain, thereby fostering innovation in sustainable finance. At its core, this dissertation champions sustainable investment. Through its findings, it can encourage traditional investors to consider ICOs as a legitimate vehicle for green investments and crypto-enthusiasts to orient their investments towards environmentally beneficial projects. Lastly, by addressing concerns like greenwashing and providing recommendations to ensure genuine environmental impacts, the study can drive higher standards of accountability and transparency in the crypto fundraising space.

Research Questions

Research Question 1:

How does the current landscape of Green Finance compare and contrast between the UK and China in terms of development, implementation, and impact?

Research Question 2:

How do FinTech and, specifically, Initial Coin Offerings (ICOs) play a role in the finance ecosystem, and what are the implications of their integration into financial systems?

Research Question 3:

What are the potential risks and challenges associated with the convergence of Green Finance and ICOs, and how might these risks impact the broader finance ecosystem?

Research Question 4:

How do the regulatory frameworks concerning ICOs in the UK and China address Green Finance, and what are the key differences and similarities in their approaches to regulation?

Research Question 5:

Based on the challenges and opportunities presented in the UK and China, what would be the effective regulatory recommendations to ensure the responsible and sustainable development of Green ICOs in each country?

Methodology Overview

This dissertation will employ a multi-method analysis of Green ICO regulations in the UK and China, evaluating their objectives, current situations, challenges, and potential for refinement. It will include descriptive analysis, legal analysis, critical analysis, policy analysis and risk analysis, which could help in distinguishing the unique characteristics, practices, and challenges of Green Finance and ICOs in both countries. While also identifying commonalities that can be indicative of broader global trends. Studying two different contexts side by side provides a richer and more nuanced understanding of the subject matter. It allows for a deeper exploration of how different regulatory, cultural, and economic factors influence Green Finance and ICOs. Besides, analyzing two distinct contexts ensures that the research isn't overly skewed by the idiosyncrasies of one country. It ensures a balanced view that encompasses diverse economic, cultural, and regulatory perspectives.

The reason to choose China and the UK is because both the UK and China are major global economies, representing the West and the East, respectively. Their financial policies and mechanisms have a significant influence on global financial trends. The UK has a more open approach to FinTech innovations, including ICOs. The Financial Conduct Authority (FCA) in the UK has been proactive in providing guidelines for ICOs, balancing innovation with investor protection. China initially embraced ICOs but later imposed a blanket ban, citing concerns over financial stability and investor protection. This offers a contrasting regulatory landscape to the research. Also, the UK is a global FinTech hub, with London hosting a myriad of FinTech startups, incubators, and investors. Its approach to ICOs has been progressive yet cautious. China, with its tech giants like Alibaba and Tencent, has revolutionised FinTech in areas such as mobile payments. Despite its stringent stance on ICOs, the underlying blockchain technology is promoted.

Moreover, the UK is among the pioneers in Green Finance with London being seen as a hub for green financial instruments like green bonds. China, given its scale and rapid industrialisation, faces significant environmental challenges. This has made Green Finance a priority for the Chinese government, making it one of the world's largest green bond markets. Therefore, China and the UK are good choices to be the target countries.

Dissertation Structure

The dissertation is structured into six comprehensive chapters that systematically explore the convergence of Green Finance and Initial Coin Offerings (ICOs) in the UK and China.

Chapter 1 introduces Green Finance, with a focused examination of its evolution and current state in both the UK and China, concluding with a summary of the topic's global challenges and relevance. Chapter 2 delves into the intricate world of FinTech, delineating the definition, mapping methodologies, and various perspectives of advantages and disadvantages. The chapter then proceeds to unpack ICOs, emphasizing their underlying technologies, structures, and contrasts to traditional IPOs. Chapter 3 marks the pivotal intersection of Green Finance and ICOs, examining the potential of ICOs within Green Finance and the inherent risks associated with this union. Chapter 4 presents a theoretical framework to understand how law can help develop Green ICOs. Chapter 5 zeroes in on the UK, scrutinizing its regulatory architecture concerning Green ICOs, dissecting regulations related to security tokens, and delving deep into the realm of Greenwashing and its regulatory countermeasures. Recommendations for refining the UK's approach are also articulated in this chapter. In contrast, Chapter 6 shifts the lens to China, providing insights into the nation's unique regulatory frameworks, its distinct approach to ICOs, and its commendable "Yue Tan" regulatory approach. The chapter culminates in recommendations, some of which are derived from the UK's experience, suggesting an enriched cross-pollination of ideas between the two nations.

Chapter 1 Green Finance

1. Overview of Green Finance

Some phenomena that endanger human survival, like global warming, rising sea levels, and energy shortages, are gradually realized by the public. At the same time, sustainable development of economies cannot be achieved without financial support. Therefore, sustainable finance addresses more on long-term growth and environmental considerations came into being. It is defined as financing related institutional and market arrangements that could contribute to the achievement of healthy, sustainable, balanced and inclusive growth, by supporting, directly and indirectly, the framework of the SDGs (Sustainable Development Goals).¹³ Green Finance is a sub-category of sustainable finance, and it does not currently have a unified definition. and this research regard Green Finance as the financial system that finances or invests in energy conservation and emission reduction projects. In the EU Taxonomy articles 3 and 9, there are more details about how to judge the activities belonging to Green Finance. This dissertation establishes that an economic activity is environmentally sustainable if it: contributes substantially to one or more of the six specified environmental objectives (e.g., climate change mitigation, sustainable use and protection of water and marine resources like solar, wind and tidal); does not significantly harm any of the environmental objectives; is carried out in compliance with minimum social and governance safeguards (e.g., OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights); and if it complies with technical screening criteria, which is established for each environmental objective. Article 9 elaborates on the environmental objectives that an economic activity must contribute to in order to be considered environmentally sustainable. These objectives are climate change mitigation; climate change adaptation, Sustainable use and protection of water and marine resources; transition to a circular economy, waste prevention, and recycling; pollution prevention and control; protection and restoration of biodiversity and ecosystems.

¹³ Green Finance Study Group September. http://unepinquiry.org/wp-content/uploads/09/Synthesis_Report_Full_EN.pdf, 'G20 Green Finance synthesis report' (2016)

Green Finance is an emerging industry because the concept that natural resources are not enough and that some by-products of the mass production process are highly harmful to both humans and its natural environment was not central in the public view until recent years.¹⁴ Hence, the lack of attention from the public and start relatively late, the industry did not develop very fast and still facing many challenges. At the G20 Summit in 2016, G20 discussed Green Finance issues for the first time and established a Green Finance research group. In 2018, the China British Green Finance Working Group jointly issued the “Belt and Road” Green Investment Principles. It formulated seven principal initiatives from three levels of strategy, operation, and innovation, including corporate governance, strategy formulation, and the use of Green Financial Tools for global use.¹⁵ Since then, China and the UK have carried out more cooperation on Green Finance. This report also lays the foundation for this research.

2. Introduction of Green Finance in China and UK

2.1 Green Finance in China

The concept of Green Finance in China has been around for a long time but did not develop very well. In 1995, the concept of Green Finance had already emerged, but it did not catch any attention from the government and the public.¹⁶ That is because, at that time, China focused more on promoting economic development while ignoring the impact on the environment.¹⁷ In 2015, with the deepening of the “Green” concept and the implementation of the Belt and Road initiative, the Green Finance in China gradually showing a good trend of rapid development. In 2016, China, as the chair of G20, had put Green Finance in the communique for the first time.¹⁸ At the same time, the People’s Bank of China and the other seven departments¹⁹ issued “Guidelines for establishing the green financial system,” which marks the formation of a

¹⁴ Marco Migliorelli and Philippe Dessertine, *The Rise of Green Finance in Europe*, 2019)p11

¹⁵ G20, SFSG Synthesis Report (n 1).

¹⁶ Wang Wen, ‘*Is Green Finance wind gap?*’ Finance (2018) p1

¹⁷ People’s Publishing House China Preparatory Committee Rep. to the UN, ‘The People’s Republic of China national report on sustainable development’ (2012)

¹⁸ *Ibid*

¹⁹ The other six departments are: The Ministry of Finance, National Development and Reform Commission, Ministry of Environmental Protection, the China Banking Regulatory Commission, China Securities Regulatory Commission, China Banking and Insurance Regulatory Commission.

national strategy to build a systematic green policy framework.²⁰ Hence, China is going to build a comprehensive Green Finance system.

Moreover, China, as a Socialist country, adopted a 'top-down' system model, which means most of the financial decision-making power is from the state council. In China, the new financial regulatory system is: People's Bank of China (PBOC), The National Financial Regulatory Administration (NFRA), China Securities Regulatory Commission (CSRC) and State Administration of Foreign Exchange (SAFE). The state council will take the lead, and the other departments will participate in policy formulation. The PBOC is the central bank and responsible for the implementation of monetary policy and maintenance of macro-financial stability. In 2023, the National Financial Regulatory Administration (NFRA) was formed in March which is a key part of the overhaul was the creation of an enlarged financial regulator, which will oversee all financial activities with the exception of the securities industry. The NFRA is mainly responsible for micro-prudential supervision and consumer rights protection, while the CSRC is mainly responsible for capital market supervision.

However, the state council still has the ultimate power, and the central bank cannot play an independent role in policymaking process like other countries. For example, when there is a need for adjustments of interest, the reserve fund and other core operations, the PBOC only can make suggestions, and if without the approval of state council, the policy will not be promulgated and implemented.

Because of the highly centralized and sub-market regulatory system in China, Green Finance is thus divided into different businesses and regulated by different departments. Unlike the UK, which is a capitalist and decentralized country (compared to China), the 'top-down' approach is based on market innovation and government guidance. Also, there is about an estimated 30-40 billion pounds each year in green investments from 2016-2020 in China to keep the industry develop faster.²¹ From a domestic perspective, the scale of the Green Finance market continues to expand, and product and service innovations continue to emerge. In 2018, China issued more

²⁰ Ma Jun, 'A Climate Friendly Financial System' (2018) Project Syndicate available at: <<https://www.project-syndicate.org/commentary/finance-climate-change-katowice-unfccc-cop24-by-ma-jun-and-cao-koch-weser-2018-12>>

²¹ *Ibid*

than 280 billion yuan (about 32 billion pounds) of green bonds, and the stock of green bonds was close to 600 billion yuan (about 68 billion pounds), ranking among the top in the world. According to statistics from the People's Bank of China, at the end of 2018, the green credit balance of national banking financial institutions was 8.23 trillion yuan (about 1 trillion pounds), an increase of 16% year-on-year; the annual increase of 1.13 trillion yuan (about 120 billion pounds) accounted for 14.2% of the increase in corporate and other unit loans during the same period. The total financing and refinancing of listed green companies in 2018 are 22.42 billion yuan (about 2.54 pounds).²² New products, new services and new formats such as green funds, green insurance, green trust, green PPP, and green leasing are constantly emerging, which effectively expands financing channels for green projects and reduces financing costs and project risks. Green Finance standards and statistics

A series of basic institutional arrangements such as systems, information disclosure, evaluation and certification have been gradually improved. Local Green Finance reform and innovation continued to advance, and many beneficial experiences that could be replicated and promoted were initially formed. From an international perspective, multilateral and bilateral cooperation in Green Finance continues to deepen, and China's influence and voice continue to increase. In 2018, the G20 Sustainable Finance Research Group led by the PBOC wrote relevant recommendations for the development of sustainable finance with Green Finance as the core content in the G20 Buenos Aires Summit Communiqué and continued to promote green global Financial consensus. The green financial network (NGFS) members of the central bank and the regulatory agency co-sponsored by eight countries, including China, have increased, and their influence has gradually increased. Overall, China is at the forefront of the world in the development of Green Finance and has built a Green Finance system in the past four years.

2.2 Green Finance in the UK

The UK started its Green Finance earlier than China and has already made some progress since 2012. In the UK, the Green Investment Bank was unique and played an important role, which was founded by the UK government in 2012. It is the first national bank dedicated to green

²² Zhong Ma, Qiuyue Zhou and Wen Wang, *China Green Finance Development Research Report (2018)* (China Finance Press 2018)

investment, and it supports the infrastructure of the UK for renewable energy, energy efficiency, and circular economy. In 2017, the government announced that the Bank would be sold to the private investment institution Macquaire Group and the Green Investment Bank is not a national bank anymore.²³ The Green Investment bank has a unique investment philosophy, and remarkable progress has been made in stimulating private investment. From 2012 to 2016, 78 investment projects have been made. The amount is about 2.8 billion pounds and brought an extra investment of about 11 billion pounds.²⁴ From this case, it can be seen that the Green Investment Bank made progresses in the UK. Therefore, although the Green Investment bank is not a national bank, it has had great success in green investment.

After the Green Investment Bank no longer belongs to the government, the UK launched its Green Finance Strategy on 2 July 2019, which aims to support the UK's economic policy, deliver its modern industrial strategy and international commitments to environment and sustainable development. There is also a Green Finance Institute to support the strategy to foster greater cooperation between the public and private sectors. Also, there is even a Green Finance Taskforce, which will set a series of recommendations on how the government and the private sector can cooperate to make Green Finance integral. Although the GIB is no longer under the control of the government, they still left some successful experience for the new Green Finance Strategy. Also, these measures of the Green Finance Strategy indicate that the UK government wants to rebuild their own Green Finance Industry.

Up to 2023, according to the report of UK government, the UK has made great progress in Green Finance. For example, according to the Global Green Finance Index²¹, London is one of the world's leading Green Finance Hubs.²⁵ Also, the UK government has made great effort to establish a greening financial system. In 2019, the UK established a Joint Government-Regulator Taskforce to explore the most effective approach to implementing the recommendations of the Taskforce on Climate-related Financial Disclosures (TCFD). At the same year, a Co-funded British Standards Institution (BSI) is designed and rolled out a

²³ Sun Yanhong, 'a comparison of the Green Finance practices of German and British policy Banks and its enlightenment' *International Political and Economic Review* (2017) p32

²⁴ *Ibid*

²⁵ HM Government, 'Mobilising Green Investment: 2023 Green Finance Strategy', 2023, p. 20.

programme of internationally relevant standards on Sustainable Finance.²⁶ In 2020, UK government was the first G7 country to commit to mandatory TCFD reporting, and published a roadmap towards mandatory climate-related disclosure. In 2021, the UK mainstreamed climate considerations into the work of the financial regulators – the Financial Conduct Authority, Prudential Regulation Authority and Financial Policy Committee - when carrying out their duties. Also, in 2021, the UK published Greening Finance: A Roadmap to Sustainable Investing focusing on ensuring that the information exists to enable every financial decision to factor in climate change and the environment. In 2022, a Climate-related disclosure requirements introduced for large companies and LLPs.²⁷ Also, UK government launched the Transition Plan Taskforce, a group of industry experts tasked with developing guidance for gold standard transition plans. In 2022, the UK signed up to a commitment in the Global Biodiversity Framework to ensure the largest companies regularly monitor and disclose their risks, dependencies and impacts on nature.

2.3 Green Finance Markets

Green Finance is subdivided into several different markets, like the green loan market, green bond market, green securities market, and green insurance market. However, the division of the market is still vague and needs a more specific definition that needs more attention from governments and international organizations, otherwise,

The Green Bond framework is the most advanced market, because it is developed within the industry. According to ICMA (International Capital Market Association), the Green Bond is defined as “any bond instrument where the proceeds will be exclusively applied to finance or refinance, in part or full, new and existing eligible green projects and which are aligned with the four components of the Green Bond Principles.”²⁸ However, the definition in China is still different from ICMA. As for China, the definition is broader for the “Green Finance”.²⁹ For

²⁶ *Ibid.*

²⁷ *Ibid.*

²⁸ ICMA, *Green Bond Principles Voluntary Process Guidelines for Issuing Green Bonds June 2018* (ICMA Paris 2018)

²⁹ Ministry of Ecology and Environment of the People's Republic of China, 'Guidelines on Constructing a Green Financial System', 2016-08-31, https://www.mee.gov.cn/gkml/hbb/gwy/201611/t20161124_368163.htm accessed 16th September 2023

example, the green bond in China covers environmental protection. The Multilateral Development Banks (MDB)- International Development Finance Club (IDFC) and European Investment Bank (EIB) standards, which are named Common Principles, are focusing on climate change.³⁰ However, in China, within the Climate Change Mitigation Policy, four categories are not included in the MDB-IDFC standard. These are energy saving on greenfield facility construction for industries with national energy consumption allowance, ultra-high voltage grid infrastructure, clean utilization of coal, and urban underground pipeline projects. In UK bond market, the standard is more open, according to the London Stock Exchange Group who defines Green Bond, and the Green Bond refers to finance projects will clear environmental benefits and the market accept the standard of ICMA Green Bond Principles and National Development and Reform Commission (NDRC) Guidelines from China.³¹

The Green Loan market follows the Green Loan Principles, and a similar framework has been offered by the Loan Market Association (LMA) and the Asian Pacific Loan Market Association (APLMA). The Green Loan Principles is issued in 2018 and inspired by the Green Bond Principles. The Green Loan is defined as “any loan instrument made available exclusively to finance or refinance, in whole or in part new and existing eligible green projects and are aligned with the four core components of the Green Loan Principle.”³² The aim of GLP is to set up a framework of the Green Loan market and provide a methodology for use across the green loan market. However, in China, there is no specific definition for the Green Loan.³³ In 2012, the China Banking Regulatory Commission issued “Green Credit Guidelines.”³⁴ However, it is the government policy rather than the industry standard, and it did not provide any clear definition for the Green Loan and market.³⁵ Also, Credit in China refers to an unsecured loan, which is only one part of the loan market. As for the UK, there are no official documents to define the Green Loan, but all the financial institutions follow the rules of the Green Loan Principle, which has already been widely accepted by other countries. If there is a big difference in the

³⁰ EIB, 'Common Principles for Climate Mitigation Finance Tracking' (2015).

³¹ London Stock Exchange, 'Sustainable Bond Market', London Stock Exchange Group, accessed on August 12nd 2023, <https://www.londonstockexchange.com/raise-finance/debt/our-products/sustainable-bond-market>.

³² Loan Market Association, *Green loan principles* (London 2018)

³³ Not all Banks in China have followed the Green Loan Principles, and ICBC is the first Chinese Bank raise green financing under the GLP.

³⁴ The Guidelines stipulates organizational management, policy system and capacity building, process management, internal control management and information disclosure, supervision and inspection of the green credit.

³⁵ China Banking Regulatory Commission, 'Green Credit Guidelines' 2012

understanding of definitions between China and the UK, there will be a lot of inconvenience and communication barriers when the two countries cooperate and learn from each other. Also, for this research, conceptual differences between China and the UK can lead to situations or problems that exist in one country and may not exist in the other.

There are also other green markets like the Green Securities market and the Green Insurance market. However, since the industry is not mature enough, and the scale is relatively small, there is no unified industry standard. They still need more exploration, and authority is needed to take the lead in setting an industry standard.

2.4 What are the current challenges?

As discussed above, it is clear that some progress had already been made. However, Green Finance still faces many challenges. Green Finance could be divided into several markets like the loan market, bond market, securities market, and insurance market. Different types of markets will face different challenges. They also have some common challenges that need to be solved.

(1) Lack of funding from the private sector

There are some common problems that Green Finance has already met. The first is that Green projects, unlike other projects, often funded by the traditional public source of finance from the government. However, it is harder to attract funding from the private part since the Green Finance project is not as easy to understand as other financial products.³⁶ The public authorities often have more professionals dedicated to investment analysis, and the public often lacks sufficient expertise. Public sector funding alone will not be sufficient to cover the cost, even the People's Bank of China, which is considered to be one of the world's largest sovereign reserves, stated that private investors need finance 85% of the country's environmental projects.³⁷

批注 [IM1]: Really? This expertise is mostly in investment banks and asset managers.

³⁶ Patrick TI Lam, Angel OK Renewable Law and Sustainable Energy Reviews, 'Crowdfunding for renewable and sustainable energy projects: An exploratory case study approach' (2016) 60 11

³⁷ Finance G, 'Green Finance' (2016) City

Therefore, for now, the Green Projects needs more funding from the private sector rather than rely on traditional funding heavily.

(2) Lack of effective department coordination and unified cooperation

Second, since the intermediaries like securities dealers also took part in a centralized system in which the most of the financial action is taken by the central bank, mobilizing funding and flow of financing is further slowed down in China. In the Chinese traditional financial systems, finance flows toward green initiatives involve burdensome bureaucratic processes and other stakeholders, and it will cause a much higher transaction cost and prevent the investment from private sectors.³⁸ To fund a green project, it might relate to multiple departments to coordinate together, and sometimes it happens within the department. For example, to raise funds for a wind power plan and borrow loans from a bank, first, the banks need to understand the EIA (Environmental Impact Assessment) indicators. EIA is used when applied to actual projects by individuals or companies applies to policies, plans and programs most often proposed by organs of state; and it is a tool of environmental management forming a part of project approval and decision making.³⁹ Basically, to financing, a Green Project will include banks (bank and the higher bank), different department of the government (Environmental Protection Department, Bureau of Planning and natural resources, and Bureau of Finance and so on) and investors. However, in China, these different sections and departments are not sharing their information which makes increased the cost of communication and time. Hence, sometimes lack of coordination and cooperation could delay projects due to unnecessary waste of time and communication.

(3) Lack of clear definition of Green Finance and its products

Third, there are still no universal and broadly accepted standards or definitions to back the reliability of existing green financial products.⁴⁰ There are some differences in the definition of

³⁸ Fuessler, J., León, F., Mock, R., et al. 'Navigating blockchain and climate action' (2018) <https://www.goldstandard.org/sites/default/files/documents/cli_report_dec18.pdf> accessed 17 Feb 2020

³⁹ Roger W Caves, *Encyclopedia of the City* (Taylor & Francis 2005)

⁴⁰ Sofie Blakstad, Robert Allen and SpringerLink, *FinTech Revolution: Universal Inclusion in the New Financial Ecosystem* (Springer International Publishing 2018)

Green Finance between China and the UK, which makes it impossible to cover all aspects of Green Finance in both countries. As for this research, this problem relates to green or sustainable labels for financial instruments, like green loans and green bonds. They do have principles that serve as the leading framework for people to follow, but there is no standard definition for “greenness”⁴¹ This might cause the chaos of Green Finance and the emergence of more marginal projects. If there is no unified definition for “greenness”, then some green projects may be unrecognised or indistinguishable, so that some potential green projects may lose the opportunity of financing. It might make it difficult for investors, companies, and Banks to find investment opportunities. Also, allocating financial resources could be difficult as well since the definition of Green Finance is the basis of internal budgeting, performance, accounting, and measurement for financial institutions. The policy design, environmental risk management, and corporate communication can be deterred due to lack of clarity. On the other side, too many definitions can also be problematic. For example, each company has their understanding of Green Finance. It will cost a lot to comparison across institutions for cross-border green investment.

(4) Lack of transparency and accountability

Fourth, the Green Finance industry still lacks transparency and accountability.⁴² It covers the problem of transparency on and access to data and the capability to measure, report, and verify whether an investment target is green and the tracking and evaluation of the use of proceeds. For example, now in China, is it difficult for the private investor to acquire the Environmental impact assessment (EIA) of the Green Projects, it is nominally public, but not searchable. As the Green Finance industry starts late and is not mature, these problems still need to be solved. For Green Finance, there needs to be a platform that makes all the necessary information available investors and regulators.

⁴¹ Igor Shishlov, Romain Morel and Ian %J Institute for Climate Economics Cochran, 'Beyond transparency: unlocking the full potential of green bonds' (2016) 1

⁴² Leonardo Paz Neves and Gabriel Aleixo Prata, *Blockchain contributions for the climate finance: Introducing a debate*, 2018)

(5) Externalities hard to internalize

Fifth, how to internalize environmental externalities appropriately and cost-effectively is considered to be the most fundamental challenge. The externality is a concept that comes from economics, which means the cost or benefit that affects the third party who did not choose to incur that cost or benefit.⁴³ Applied explicitly to Green Finance, such externalities sometimes could be positive for green investment, since the benefits accrue to the third parties. However, it could also be harmful when the polluting investment causes the loss of a third party. Here are two examples of positive externalities and one negative externality in Green Finance.

Reduced pollution is typically considered a positive externality. When a company takes action to reduce its pollution—for instance, by installing pollution control equipment or by adopting cleaner technologies—it not only benefits itself by potentially reducing regulatory penalties or enhancing its public image, but it also benefits the wider society. The local community, the environment, and even broader ecosystems benefit from cleaner air, water, and soil. These societal benefits are not typically captured in the regular market transactions. The concept of internalizing an externality involves adjusting the market outcome to take into account these external effects. There are some factors that make it difficult for companies to internalize the externality. First, cost concerns, implementing pollution control measures or adopting sustainable practices often comes with an upfront financial cost. While there can be long-term savings and benefits, the initial investments might deter businesses, especially when competitors aren't making similar investments. Second, measurement difficulties, quantifying the benefits of reduced pollution is challenging. It is hard to assign a monetary value to cleaner air or water, or to the health benefits enjoyed by the local community. Third, mismatched incentives, the benefits of reduced pollution are spread across society, while the costs are borne by the company. Without regulations or incentives in place, companies might not have the motivation to act in the broader public interest. Fourth, lack of Information, some firms might not be fully aware of the pollution they cause or the potential methods to reduce it. There might also be a lack of information about the long-term financial benefits of sustainable practices. Fifth, regulatory gaps, in some regions or industries, regulatory frameworks might not be stringent or enforced

⁴³ James M Buchanan and William C Stubblebine, 'Externality', *Classic papers in natural resource economics* (Springer 1962)

rigorously. When there's no legal compulsion or financial incentive (like tax breaks), firms might not prioritize pollution reduction. Last, market structure, in some markets, especially where a few firms have significant power or monopolies exist, there might be less competitive pressure to adopt sustainable, consumer-friendly practices.

The renewable energy project usually has more construction cost than traditional alternatives. It is often perceived that renewable energy projects incur higher initial construction and installation costs compared to traditional fossil fuel-based alternatives. However, it is essential to consider that operational and maintenance costs for renewables are generally lower, and renewables do not incur fuel costs. Given the rapidly evolving nature of energy markets and technologies, it is advisable to refer to the most recent reports from authoritative sources such as the International Energy Agency (IEA), the U.S. Energy Information Administration (EIA), or equivalent organizations for the most accurate and up-to-date information on construction costs, Levelized Cost of Electricity (LCOE), and other relevant data points related to renewable and non-renewable energy projects. As an example, based on data available up to 2022, the LCOE for solar PV without considering subsidies was between \$20 - \$60 per megawatt-hour, while coal was generally above \$60 per megawatt-hour, but these values can vary significantly depending on the location, project specifics, and updated technology costs.

Since it might lack measures to internalize the benefit of reduced pollution, green projects make less return and make it harder to attract funding from the private sector. In this case, many countries adopt measures like tax credit⁴⁴, emission-trading system⁴⁵, renewable portfolio standard⁴⁶, and regulation. Also, there are some financial measures like credit enhancements and guarantees, grants and subsidies are taken by some countries to improve risk-adjusted return

⁴⁴ Usually the government offers tax incentives for Green Projects, in China, tax reduction and exemption for “three wastes” enterprises; tax incentives for environmental technologies such as energy conservation and pollution control and investment in environmental protection; tax measures to restrict polluting products and projects; tax incentives to promote the efficient use of natural resources.

⁴⁵ For example, the UK Emissions Trading Group, which is a voluntary emission trading system created as a pilot prior to the mandatory EU Emission Trading Scheme. It recruited 34 participants from UK industries and organizations who promised to make reductions in their carbon emission, it has expanded to 54 sectors of the UK economy; in return, they received a share of a £215 million” incentive” from the Department for Environment, Food and Rural Affairs.

⁴⁶ In UK it also called the Renewables Obligation, and it is designed to encourage generation of electricity from eligible renewable sources in the UK. Suppliers meet their obligations by presenting Renewable Obligation Certificates (ROCs) to Ofgem (Office of Gas and Electricity Markets) when supplier do not have enough ROCs to fulfill their obligation, a payment is made into the buy-out fund.

to such projects. Another positive example is the PPP (Public, Private, Partnership) approach.⁴⁷ To be specific, land remediation, water treatment could improve the living standard for the local community and the property's value like houses. However, these projects also need proper mechanisms to monetize positive externalities. Otherwise, they are still not attractive enough to draw attention from private capital. In this case, the PPP approach seems feasible. For example, the excess return (since the green project improves the environment in the future) from the real estate developer, can be paid to investors to make compensation.⁴⁸ For some countries, they have already adopted a similar business model in the subway project and clear transportation. These projects are combining with residential and commercial property projects since they can boost the market value for property projects.

If some firms pollute the environment and cause the damage, but the negative externalities cannot be internalized fully. For example, the citizen who is affected by the pollution does not seek compensation from the firm. There will be more excessive investment and production in polluting activities.⁴⁹ Some actions will be taken by financial institutions to solve negative externalities like Equator Principles⁵⁰ for project finance in the banking sector and disclosure requirements for listed companies by stock exchanges.

(6) Maturity mismatch

The sixth challenge is Maturity mismatch, which describes the contraction between saver demanding liquidity and long-term project investment requirement. It happens a lot in the banking area and bond markets. It is a common challenge in the financial market and sometimes fails green infrastructure projects. The main problem is that the financing of long-term green infrastructure projects depending on the loans from the bank heavily. However, the bank is

⁴⁷ Examples of PPP green projects include those on waste treatment (Canada), high-speed rail (France, Spain, South Africa, and Japan), and subways (Hong Kong, Singapore, and the Philippines). See OECD, 2013, "Mobilizing Private Investment in Sustainable Urban Transport Infrastructure."

⁴⁸ G20, SFSG Synthesis Report (n 1).

⁴⁹ Ibid

⁵⁰ The equator principles constitute an international voluntary code developed by banks to encourage consideration of environmental and social issues in project financing. Such codes can flexibly bridge the gap between individual companies' sustainability initiatives and mandatory, legal regulation.

limited, offering sufficient long-term loans since the bank usually has a shorter tenor of liabilities.

While the maturities of green bonds can vary widely based on the project's needs and market dynamics, many green bonds, especially those financing long-term infrastructure or environmental projects, may have longer maturities. However, it's essential to note that green bonds can be issued with short, medium, or long tenors, much like conventional bonds, and their maturities are influenced by a combination of project requirements, issuer preferences, and investor demand. Generally, to build an energy efficiency building cost more than a less energy-efficient building.⁵¹ For example, it will spend more combined capital expenditure and operational expenditure compared to a coal fire power plant. For the traditional firepower plant, the operational expense could be a big part of the cost of the whole lifetime. It can be funded by shorter tenors, not for green projects like wind or solar projects, and they cannot be financing in that way. In a nutshell, when the project is in urgent need of funds, the fund can be injected quickly. However, due to the long cycle of energy conservation projects, investors are not inclined to invest funds into long-term projects, and the returns are uncertain in the future.

(7) Asymmetric information

The seventh problem for Green Finance is the asymmetric information in the market and also involved with transparency problems. The information asymmetry could happen between investors and green project company or different institutions. For example, many investors might have a keen interest in investing in the Green Project. However, some of the companies did not disclose their environmental information, which will increase the search costs and make their project less attractive. As for the information asymmetric between financial institutions, in some countries, there is a segregation of data between banking and environmental regulators, which exacerbates the information asymmetry.

Another example of information asymmetric is sometimes investors are unwilling to invest in green projects because of the lack of knowledge of business viability and uncertainties of the

⁵¹ Compared with thermal power, wind power is more difficult to control reserves and more expensive invest in long-distance high-voltage transmission lines, thus incurring additional costs.

Green Finance policy. There are some measures have been taken by countries, for example, demonstration projects by government-backed entities like UK investment Bank or Multilateral Development Banks (MDBs); bright policy outlook for sustainable development like National Green Technology Policy of Malaysia and the Kingdom of Saudi Arabia's Vision 2030; credit guarantees by government agencies like loan guarantee program of the US Department of Energy for renewable energy projects or Development Finance Institutions.

Also, the information asymmetry could also lead to Greenwashing, which will be discussed in the Chapter 5. Greenwashing often thrives in environments where there's asymmetric information. Companies can capitalize on consumers' lack of information or the complexity of environmental certifications and standards. Because consumers might not have the means or expertise to verify environmental claims fully, they rely on the company's report. If those reports are misleading or false, consumers can be deceived into supporting products or companies they believe are green. As a result of greenwashing, consumers might become sceptical of all environmental claims, even legitimate ones. This scepticism can be harmful to companies genuinely trying to make a difference as they're lumped together with those that are greenwashing. To combat the issues arising from asymmetric information and greenwashing, many advocate for more stringent regulations on environmental claims and greater transparency in reporting. Certifying bodies, standardized metrics, and third-party audits can help bridge the information gap.

(8) Inadequate analytical capability

Inadequate analytical capability is the last challenge that Green Finance might face. In general, the understanding of the financial implications of environmental risks by financial institutions is still at an early stage. Sometimes, banks and institutional investors underestimate the risks of brown investments and overestimate the risk of green investment opportunities because they cannot identify and quantify the credit and market risk that might appear from environmental exposure. This kind of challenge is different from information asymmetry because it is caused by lack of enough analytical capability rather than being reluctant to disclose existing information. This problem is also caused by the fact that the traditional risk assessment cannot keep up with the development of financial products and lacks sufficient technical

analysis ability. It is essential to have a good understanding of risk mitigation, which make helps with the internalization of environmental externalities in decision-making and for mobilizing finance for green investment.

3. Summary

This chapter mainly delves into the nuances of Green Finance, with a particular focus on its adoption in China and the UK. While both nations exhibit a growing affinity for sustainable financial practices, they face shared challenges, including securing private sector funding, maintaining inter-departmental coordination, and defining the parameters of 'green' in financial contexts. The discourse further explores obstacles like information asymmetry, maturity mismatches, and the need for improved analytical tools, underscoring the complexities of merging environmental sustainability with economic objectives.

Chapter 2 FinTech and ICO opportunity

1. Introduction

The history of human development is accompanied by the continuous upgrading of technology. The steam engine, Information Technology (IT), the Internet, Big Data, and Artificial Intelligence have brought tremendous changes to human production and life. The changes brought about by FinTech are considered disruptive innovations, which have changed the way traditional finance works.⁵² Since the 2008 financial crisis, the public's trust in financial intermediaries has declined, and a series of decentralized innovative products from FinTech have emerged one after another, such as cryptocurrency, and P2P loans. The disruptive innovation of FinTech poses unprecedented challenges to the traditional financial regulatory model, theoretical logic, and legal system. In the history of financial regulation, there is a circle of "deregulation, excessive innovation, financial crisis, strict supervision, suppression of innovation and deregulation."⁵³ These Financial technologies provide new way for traditional

⁵² Arner, Barberis and Buckley, 'The evolution of FinTech: A new post-crisis paradigm'ibid

⁵³ Dong Yang, 'Regulatory technology: the regulatory challenges and dimension construction of FinTech', CSS (2018). p70

financial areas, but they also have some disputes and flaws. In order to meet the challenges brought by FinTech innovations, how to make up for the shortcomings of the traditional financial supervision model while promoting its development and breakthrough the regulatory cycle problems has become the primary task of financial technology supervision.

Before conducting supervision on financial technology, the first thing to do is figure out what FinTech is and the classification of its innovative products. Accordingly, this chapter will first introduce the definition of FinTech and its development background. Second, introduce the core technologies of FinTech. Third, ten categories are made for FinTech and its innovative products. Fourth, the current advantages and disadvantages of financial technology. Fifth, analyze why traditional financial regulation cannot cope with the challenges posed by financial technology. Sixth, Highlights the ICO technology and its possible application in the field of Green Finance. Finally, create an effective regulatory model to meet the challenges of FinTech.

2. The definition of FinTech

Before 2016, there is no uniform definition of FinTech in the world. In China, FinTech is often indistinguishable from the concept of Internet Finance.⁵⁴ In 2016, the Financial Stability Board came up with the definition: "FinTech as technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services."⁵⁵ Then EU Commission adopted the exact definition in the FinTech Action Plan.⁵⁶ Following in the footsteps of the EU Commission, the People's Bank of China has adopted the FSB's definition of FinTech in its latest FinTech development plan in 2019.⁵⁷ The definition of FinTech proposed by the FSB is also recognized by many countries like the UK and the US.

⁵⁴ There are two opinions on the definition of Internet Finance in Chinese academia. Some consider Internet Finance as a new financial model and operating structure that can greatly improve the efficiency of financial operations. Others think that Internet Finance is a financial business operated through the Internet, and Internet is only an approach. See at Ping Xie, 'Basic Theory of Internet Finance', 2015

⁵⁵ FSB, 'FinTech Innovation and Structural Change', 2016 <https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/FinTech/> accessed 2021 January 20th.

⁵⁶ European Commission, 'FinTech Action Plan: For a more competitive and innovative European finance sector,' (2018) p2

⁵⁷ PBOC, 'Financial Technology (FinTech) development Plan 2019-2021,' (2019) p6

The development of FinTech is a process of continuous integration of different sectors of technology and finance. The emergence of some technologies was designed and served for the financial industry from the beginning, while some were later applied to the financial industry. The core technology of FinTech is Artificial Intelligence (AI), Big Data, Robotic Process Automation (RPA), Blockchain (will be further discussed in section 5.1.1), and Internet of Everything (IoE).⁵⁸ The AI technology can be used in many forms like robo- advisors, which can provide insight on customer spending habits and allows financial institutions to understand their clients better or offer customers practical investment advice.⁵⁹ Big Data is always used to predict the investment and choose the right strategies and portfolios for the clients, and it can be used in repetitive tasks. For example, it can help to process financial information like payable and receivable more efficiently.⁶⁰ Also, the blockchain is another prevalent technology used in the financial area, and its main feature is decentralization and anonymity. It also has an extensive range of innovations, such as Cryptocurrencies, smart contracts, supply chain, health care, and so on. Simultaneously, there are many new technologies like biotechnology (Face recognition) applies in the financial sector. However, they are still not mature enough or did not take on the core role in financial transactions.

As FinTech has brought significant changes to the traditional financial industry, investment in the FinTech industry has also increased year by year. In 2017, the total deal value of global investment activity (VC, PE, and M&A) in FinTech was \$59.2 billion; in 2018, the amount is about \$145.9 billion; and in 2019, it reached \$168 billion.⁶¹ However, due to the impact of the COVID-19 virus, the total investment value suffered heavy losses in the first half of 2020, and it declined to \$25.6 billion. In the second half of 2020, the investment amount rebounded, and the whole year amount is \$105.3, which is still a sharp decline but better than the first half of

⁵⁸ Bernardo Nicoletti, Weis Nicoletti and Weis, *Future of FinTech* (Springer 2017)

⁵⁹ The New York Times, 'Financial Advice for People Who Aren't Rich,' (2014) <<https://www.nytimes.com/2014/04/12/your-money/start-ups-offer-financial-advice-to-people-who-arent-rich.html>> (accessed 20th January 2021)

⁶⁰ Federicao Berruti, 'Intelligent process automation: The engine at the core of the next-generation operatingmodel,' <<https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/intelligent-process-automation-the-engine-at-the-core-of-the-next-generation-operating-model#>> (accessed January 22th 2021)

⁶¹ KMPL KPMG, 'Pulse of FinTech H2 2020', (2020)

the year.⁶² Although the FinTech market has been affected by the epidemic, it is still recovering and stabilizing.

In fact, although the definition of FinTech has only been finalized in recent years, its origin has a long history of development. The development of FinTech has experienced three stages.⁶³ The first stage is from 1866 to 1967, when the financial services were linked with technology, but mainly analog industry.⁶⁴ The second stage is from 1967 to 2008, and this is the age of traditional digital financial services.⁶⁵ As for the third stage, the Global Financial Crisis in 2008 is considered to be the turning point and catalyzed the growth of the FinTech 3.0 era.⁶⁶ Starting from blockchain, to big data and AI, technologies in the FinTech 3.0 era are still innovating and iterating, and new technologies are also constantly integrating with the financial field.

3. Two approaches to map FinTech

FinTech is generally defined in terms of market function, market institutions, market technology, market structure, and market impact and disruption.⁶⁷ Additionally, FinTech is defined as technology-enabled financial solutions or financial solutions delivered using technology. Savings and deposits, loans and credit, payments, investments, and risk management could be

⁶² The investment in the second half of the year is powered by surge in venture capital, for reason that, for reason that investors and FinTeches learned to do business in new normal, like 'work from home'.

⁶³ Arner, Barberis and Buckley, 'The evolution of FinTech: A new post-crisis paradigm'

⁶⁴ In the 19th centuries, technologies like telegraph, railroad, canals and steamships helped to transfer the financial information, transactions and payment around the world. After the Second World War, the technologies in communications and information areas were developed rapidly during the wartime. At the same time the technological advancement of some large companies has greatly promoted the development of the financial industry. For example, in 1950s, Bank of America and American Express introduced credit cards; then the Interbank Card Association (now Mastercard) was established and started the consumer revolution; in 1967, the ATM is invented by the Barclays in the UK and it is regarded as the beginning of the FinTech 2.0 era.

⁶⁵ During this period, the financial services changed from analogue to a digital industry. A series of milestone technological developments constitute the foundation of today's financial industry. For example, in the UK, Inter-Computer Bureau was established, and it formed the basis of Bankers' Automated Clearing Services (BACS), which is an electronic system to make payments directly from one bank account to another; then in 1970, the US Clearing House Interbank Payments System (CHIPS) was established, which helps to process interbank payments cross border and domestic transactions; the Society of Worldwide Interbank Financial Telecommunication (Swift) was established in 1973 and it showed the need to interconnect domestic payments system cross the countries. For the securities area, NASDAQ, established in 1971, and the National Market System together changed the market from physical trading of securities to today's fully electronic securities trading. Then, with the development of IT industry, the financial services gradually realized paperless. The emergence of World Wide Web (WWW) set the stage for next level development, and it can provide online account checking. By 2001, there are more than 1 million customers online in the eight banks of the US.

⁶⁶ Ibid (n 10).

⁶⁷ G.A. Walker, 'Financial Technology Law', (unpublished 2020)

viewed as financial solutions. Among the five approaches to define the FinTech. This dissertation will classify FinTech from these two: market function (the role FinTech play in the market) and market technology (the technologies behind FinTech), which are more intuitive and easier to understand.

3.1 Market function

(1) Digital Coin (Coin Tech)

The electronic currency like E-CNY and digital pound are another form of legal tender issued directly by financial institutions or government (see the table 1). Their credit is guaranteed by the credibility of the government, so in countries with relatively stable financial markets, the value of their currencies is usually relatively stable. The supervision is also through the promulgation and implementation of various laws and regulatory regulations by the country's financial institutions. Virtual currency is a kind of currency with relatively loose issuance and supervision. It is usually issued by a company or organization, and basically circulates within its members. Therefore, its credit is mainly guaranteed by companies or organizations. The digital currency or cryptocurrency like Bitcoin and Ethereum are issued by algorithms and guaranteed by the common belief of all participants. The currency is kept in e-wallets. Because of its decentralization nature, there is no regulatory agency se as its designers intended. However, all countries are regulating the exchange of legal currency through their exchanges.

	Electronic Currency	Virtual Currency	Digital Currency
Issuer	Financial institutions	Network Operators	Algorithm
Scope of Use	No limitation	Enterprise	No limitation
Issue Number	Determined by Fiat	Determined by Issuer	Certain Amount
storage Form	Card or Account	Account	Digital Form in the wallet



Ways of Distribution	Two-way flow	One-way flow	Two—way flow
Monetary Value	Equal to legal tender	Not equal to legal tender	Not equal to legal tender
Credit Guarantee	Government Credit	Enterprise Credit	Netizens Belief
Transaction Security level	High	Low	High
Transaction Costs	High	Low	Low
Runtime Environment	Intranet, Extranet, Read and write equipment	Enterprise Server and the Internet	P2P Network
Typical Example	Bank Card, E-CNY, digital pound	Forum Points, Game Coins	Bitcoin, Litecoin

Table 1 The difference between Electronic Currency, Virtual Currency, and Digital Currency

The digital currency or coin is a concept that has been around for some time. The first digital cash was initially developed by the US cryptographer David Lee Chaum.⁶⁸ Now, people are more familiar with digital coins like Bitcoin, Lite Coin, and Dogecoin. Bitcoin, as the pioneer of digital currency, was introduced by Nakamoto in 2008.⁶⁹ In his article, he describes the mechanism of Bitcoin and explains its algorithm. Then, in 2009, he created the first Bitcoin software and set up the financial system of Bitcoin. The purpose of establishing such a system is that Satoshi Nakamoto considered the current trust-based model has its inherent weaknesses—mediating problem.⁷⁰ Trust-based model is financial transactions typically require a trusted third party, such as a bank or credit card company, to process transactions. This system means

⁶⁸ Chaum had developed a public and private key based privacy system based on Blind Signature Technology in 1982. David Chaum, 'Blind signatures for untraceable payments' *Advances in Cryptology Proceedings of Crypto* [1983] 82 (3) 199-203.

⁶⁹ *Ibid* (n 16)

⁷⁰ *Ibid*.

that individuals must trust these intermediaries to correctly and securely handle their money, keep accurate records, protect user data, and execute transactions as requested. This model could increase the transaction costs, cut off the possibility of small transactions, and there is also a considerable cost when losing the ability to make non-reversible payments for non-reversible services.⁷¹ After Bitcoin, there are more and more digital coin appears in the market.⁷² According to the CoinMarket Cap, there are more than 4000 kinds of the digital coin in the digital coin market, and the market cap is about 1,449,718,628,676 USD, which has increased significantly from January 2021.⁷³ Although the digital currency has been criticized for its security and easy use as a money-laundering tool, it has attracted many investors to join it for profit.

To summarize the differences between the electronic, digital and virtual currencies, the E-money are digital representation of fiat currency. It is used in electronic wallets and prepaid cards. It is issued and regulated by central authorities. Typically issued and regulated by central authorities such as central banks, financial institutions, or licensed payment providers. Digital Currency means all forms of money in digital format which includes both electronic currency and virtual currency it can be either centralized or decentralized. This is a broad category. The issuer can be a central authority (for centralized digital currencies) or a decentralized network (for decentralized digital currencies). The Virtual Currency refers to digital currency without legal status as money in most jurisdictions and it includes cryptocurrencies. It can be centralized like in-game currencies and it can be issued by private organizations, especially in the case of centralized virtual currencies used for specific online platforms or games.

There is growing attention about cryptocurrencies in the academic literature. The discussion focuses on whether the digital coins are supposed to disrupt the economy or are a speculative bubble that might crash or favor money laundering and criminals.⁷⁴ In support of the first opinion, digital currencies meet the market need for faster and safer payment and transaction systems, disintermediating monopolies, banks, and credit cards.⁷⁵ The critics of digital

⁷¹ Ibid.

⁷² The source code of Bitcoin is available at GitHub, a hosting platform for open source and private software projects. The programmer can copy and modify their own digital coin projects, and develop other alternative digital coins like Lite Coin, Dogecoin.

⁷³ See at CoinMarketCap, < <https://coinmarketcap.com/charts/>> (accessed 2021 February 12nd)

⁷⁴ Giancarlo Giudici and others, 'Cryptocurrencies: market analysis and perspectives' (2020) 47 1

⁷⁵ Ibid

currencies are that the unstable value of cryptocurrencies makes them more a purely speculative asset than a new type of money. Also, there are many countries that treat them as foreign currencies. The fact is cryptocurrencies did perform some useful functions in the market and adding economic value, while the price is still volatile. Therefore, many countries still hold a wait-and-see attitude towards digital currencies and impose a certain degree of supervision.

(2) Loan Service (Loan Tech)

Lending is a popular service in FinTech, and it is changing the traditional consumer and commercial way of lending. Many FinTech lenders use machine learning algorithms, Big Data analytics, mobile technology, and social networks to identify potential borrowers and evaluate their risks. Having understood the risks, lenders could set terms of the loan and loan rate accordingly.⁷⁶ There are three types of loans in the FinTech lending area: online exchanges, online loans, and peer-to-peer (P2P) loans.⁷⁷ Since 2010 there has been \$75.96 billion invested into FinTech companies specialising in both consumer and business lending.⁷⁸ The loan market has great potential and is likely to continue to grow.

P2P loans are also constantly being combined with other financial technologies to make up for p2p loan own shortcomings. There is a trend that P2P platforms voluntarily or mandated by regulators to adopt Artificial Learning and machine-learning to enhance underwritings and detect fraud. Also, some of the platforms have incorporated blockchain and smart contracts and aiming to improve the security, transparency, and speed of the lending process across the platform.⁷⁹ For example, they collect users' credit information, and then make ratings based on

⁷⁶ Anna S Chernobai, Svetlozar T Rachev and Frank J Fabozzi, *Operational risk: a guide to Basel II capital requirements, models, and analysis*, vol 180 (John Wiley & Sons 2008)

⁷⁷ The typical example of online exchanges is LendingTree which is an online lending marketplace headquartered in the US. Its borrowers can connect with multiple loan operators to find optimal terms for credit cards, loans, and deposit accounts. Then, the borrower can compare competitive rates and terms across financial products. The Quicken Loans is the example of online lenders, and it relies on wholesale funding to make its loans and uses online application rather than system. The P2P loan provide a platform to allow individual borrowers to enter their funding needs and then, the funding is borrowed directly from other individuals. There is no bank involved in the whole process.

⁷⁸ Venture Scanner, '2020 Emerging Technologies Summary Report,' (2020) <https://www.venturescanner.com/2020-summary-report/> (accessed January 23rd 2021)

⁷⁹ Alexander Bachmann and others, 'Online peer-to-peer lending-a literature review' (2011) 16 1

users' different credits, and provide different loan plans. In this way, the risk of loan default can be reduced to a certain extent.

(3) Payment (PayTech)

Digitization has changed many areas of people's daily life, and new payment methods. There are many innovations in the mobile payment area introduced both by FinTech start-up firms and established technology firms. PayPal is one of the top companies in PayTech area, and it was set up in 1998, then acquired by eBay in 2002. By 2014, PayPal has 153 million digital wallets and processed \$203 billion in payment, and its market valuation reached about \$46billion.⁸⁰ Another example is the Chinese giant financial company Alipay, which overtook PayPal as the world's largest mobile payment platform in 2013.⁸¹ On 31st March 2018, the number of Alipay users reached more than 870 million. Now, Alipay is the number one mobile payment service organization and the second-largest payment service organization in the world.⁸² Alipay's rival WeChat Pay entered the market later than Alipay in 2011 and became the world's largest standalone mobile app in 2018 with over 1 billion monthly active users.⁸³ These two applications are not only can be used for personal collection and payment but also for transactions of individual merchants, which significantly promotes the convenience of transactions. If you are an individual merchant, you can set up your own QR code, and when the customers want to make the payment, all they need to do is to scan the code and input the amount of money. During the pandemic of COVID-19, the government actively advocates the implementation of paperless payment. Alipay and WeChat Pay provide the necessary method for the public safety and health of society.

⁸⁰ 'eBay Does About-Face in Spinoff of PayPal Backed by Icahn' The New York Times (30 September 2014).

⁸¹ John Heggstuen, 'Alipay Overtakes PayPal As The Largest Mobile Payments Platform in The World,' (2014) <<https://www.businessinsider.com/alipay-overtakes-paypal-as-the-largest-mobile-payments-platform-in-the-world-2014-2>> (accessed January 24th 2021)

⁸² ShangfangwenQ, '870 million! Alipay first announced the number of users: No.1 in the world,' (2018) <<https://news.mydrivers.com/1/575/575709.htm>> (access January 25th 2021)

⁸³ Nicole Jao, 'WeChat now has over billion active monthly users worldwide,' (2018) <<https://technode.com/2018/03/05/wechat-1-billion-users/>> (access January 25th 2021)

China is currently in a leading position in the field of mobile payment, and the security of mobile payment has always been a concern of the public.⁸⁴ In order to ensure the security of mobile payment, PayTech is constantly integrating with other technologies. For example, Alipay has combined a real-name system, fingerprint recognition, and face recognition into mobile payment security verification.⁸⁵ Like cryptocurrency, the mobile payment industry faces problems such as money laundering because data does not flow directly into the bank's clearing system. Hence, in 2017, The PBOC (The People's Bank Of China) issued an order to urge all mobile payment companies to operate their businesses via a new centralized clearing system called China Net Union Clearing Corporation. Alipay and WeChat Pay have to share payment data (proprietary information) with other payment service providers who are also members of the Net Union.⁸⁶ Therefore, the Chinese government guarantees that mobile payment will not be reduced to a tool for money laundering and asset transfer through this supervision method.

(4) Insurance (InsureTech)

InsurTech means the application of technological innovation to the insurance industry. After the Global Finance Crisis in 2008, more and more insurance companies relied on technology and advanced data analytics. For example, ~~the Munich RE company~~ is trying a new way to acquire data about your body health and car conditions by the use of wearable sensors.⁸⁷ Before ~~the~~ COVID-19, InsurTech was the largest FinTech sector to watch ~~going forward~~.⁸⁸ InsurTech startups has raised almost \$6.7 billion in funding in 2019, which was up from \$3.87 billion the year before and \$3.7 billion in 2017.⁸⁹ It seems that the pandemic has offered more lift to this area. For example, under the "stay at home" policy around the world, there is also less of a demand for automobile insurance. Some InsurTech companies, like Metromile, offer pay-per-mile

⁸⁴ Wenzheng Liu, Xiaofeng Wang and Wei Peng, 'State of the art: secure mobile payment' (2020) 8 IEEE Access 13898

⁸⁵ Lerong Lu, 'Decoding Alipay: mobile payments, a cashless society and regulatory challenges' (2018) Butterworths Journal of International Banking and Financial Law 40

⁸⁶ The other members of CNUCC are central bank's affiliated intuitions, state agencies, the State Administration of Foreign Exchange. The CNUCC has a registered capital of CNY 2bn (about \$300 m).

⁸⁷ For example, they can get information from Fitbit, apple watch and dashboard of an automobile, and they can dynamically reprice insurance policies.

⁸⁸ According to Venture Scanner data, InsurTech

⁸⁹ Ibid (n 13)

automobile insurance. Thus, the "stay at home" policy and local quarantines make products more attractive to the mainstream in the near term.⁹⁰

According to the different directions of InsurTech business, InsurTech can be divided into three parts: InsurTech that connects online insurance sales, InsurTech that drives the upgrade of insurance business, and InsurTech that innovates ecosystem products.⁹¹ An example of InsurTech that connects online insurance sales is the Online Insurance Mall.⁹² The InsurTech that drives the upgrade of business means integrate AI, big data, cloud computing, and other technologies into insurance product development, pricing underwriting, claims settlement, marketing, and distribution.⁹³ For example, ZhongAn Insurance launched primary disease insurance designed and developed based on wearable device data. The last part refers to the gradual emergence of demand for online shopping, tourism, and other ecosystems along with the upgrading and development of consumption; insurance companies use large-scale dynamic data analysis to support the product design, pricing, and marketing of insurance companies and gradually spawn innovative insurance products. For example, return freight insurance is an insurance product with a high usage rate on Taobao as online shopping continues to develop.⁹⁴ The above examples show that the integration of technology into the insurance industry has improved the efficiency of the insurance industry and opened up new insurance businesses.

(5) Investment and Wealth Management (Robo-Advisor)

It is considered that wealth management has experienced significant changes because of the emergence of FinTech.⁹⁵ The primary purpose of the financial advisory industry is to help

⁹⁰ China Ping An Insurance Mall provides various types of online insurance services, such as health insurance, accident insurance, corporate insurance and travel insurance. Customers can directly apply for insurance online.

⁹¹ Siyu Wang, '2020 China Insurance Technology Boutique Report', LeedLeo, (2020) https://pdf.dfcfw.com/pdf/H3_AP202012251443762303_1.pdf?1608892299000.pdf accessed March 18th 2021

⁹² Ibid

⁹³ Ibid

⁹⁴ In order to resolve the disputes caused by the buyer's freight expenses in the return of goods, the insurance company, in accordance with the characteristics of online transactions, timely launches return freight insurance products, also referred to as "return insurance". Return shipping insurance (buyer) is currently only for goods that Taobao supports 7-day return without reason. Buyers can choose to insure when purchasing goods. In the event of a return, within 72 hours after the end of the refund, the insurance company will agree to pay the buyer's return shipping costs.

⁹⁵ Juan Jose Cortina Lorente and Sergio L Schmukler, 'The FinTech revolution: A threat to global banking?' (2018) World Bank Research and Policy Briefs

investors or institutions to make proper investments, achieve investment goals of investors considering long or short-term investment horizons.⁹⁶ Robo-advisors are digital platforms comprising interactive and intelligent user assistance components guiding customers through an automated investment advisory process.⁹⁷ By harnessing the power of Big Data Analytics and automated algorithm, robo-advisors automate parts of the investment process. Technology is used to reduce the complexity and lower the high costs often associated with wealth management. Betterment and WealthFront are the leading companies in the area.⁹⁸ This sector is growing in popularity and not just with the digital native demographics but also with older, wealthier clients who have come to accept these products. The robo-advisor provides investors with retirement plans which can appeal to the old. During the COVID-19 pandemic, customers are limited to have face to face meetings with their financial advisor and are more likely to use online solutions. Unlike the traditional way of asset management, robot-advisor charges lower fees and has lower minimum investment requirements, making them especially suitable for the general public. This makes robo-advisors more competitive than traditional financial advisors.

Financial advisors have also gone through three stages of development. Technological changes have allowed ordinary people with small investments to enjoy investment advisory services. The first stage is traditional advisory period. Only wealthy investors could enjoy individual investment advice because the fees charged for this kind of advice used to be relatively high.⁹⁹ Then, there a significant change in the 1970s as they introduced discount brokers, who are much cheaper than traditional financial advisors. They do not offer accurate investment advice but execute buy and sell orders at a reduced commission. It makes the stock market accessible to ordinary people.¹⁰⁰ The emergence of the Internet also plays an important role; the Internet allows not only high net worth and wealthy investors but also retail investors to manage their

⁹⁶ Dominik Jung and others, 'Robo-advisory' (2018) 60 81

⁹⁷ Ibid

⁹⁸ The Betterment is a tech-driven investment consult company, and it started in 2010 after the financial crisis. The company will gather your information when you sign up, then it will help you set financial goals and set you up with investment portfolios for each goal. Betterment has an average annual investment return of under 8.8%. Similarly, Wealthfront is another automated investment service firm which was founded in 2008. As of May 2020, it has more than \$13.5 billion of assets under management. Wealthfront is at 7.62% on its taxable portfolios, and 8.52% on its tax-advantaged portfolios.

⁹⁹ The personal financial advice and wealth management in general were exclusive and highly expensive services for the ultra-high net individuals (having a net worth higher than \$30 million in 1950). The potential investors that could afford personal advice are usually considered to be the representatives of the rich families.

¹⁰⁰ Paolo Sironi, *FinTech innovation: from robo-advisors to goal based investing and gamification* (John Wiley & Sons 2016)

own portfolios. The development of the third stage is entirely driven by technology. The robo-advisor could provide more reasonable choices and information for the customers, so the information asymmetry has been dramatically reduced, and the interconnection of computers, smartphones, and tablets makes information easier to obtain.¹⁰¹ Subsequently, algorithmic trading and big data analytics pave the way for further automation in investments. These technological developments simplified the user experience, lowering the fees and contextually develop new investment strategies for potential investors, and finally integrated them into robo-advisors.

(6) Smart Contract (SmartTech)

Smart Contract is based on blockchain technology. It comes from the article in 1996 by computer scientist Nick Szabo. He believed that with the rapid development in computer science, an algorithm would be created to handle all sorts of contracts eventually.¹⁰² However, the idea at that time is too advanced, and there was no matching technology available.¹⁰³ After blockchain technology came out, the basic platform and ecosystem became possible and smart contracts came true.¹⁰⁴ Recent developments in blockchain platforms like Ethereum, Fabric, and Hyperledger, as well as programming languages such as Solidarity, have provided opportunities for smart contracts. In the smart contract, parties are free to code any conditions they desire. These conditions are compiled into bytecode and run on blockchain as a smart contract. Parties are also capable of securing funds for the smart contract to execute the disposal of the assets. Funds in the disposition of smart contracts can only be transferred in concord with its code.¹⁰⁵ This makes smart contracts more reliable and safer.

Smart contracts can also integrate with other fields. For example, in the insurance area, insurance companies and policyholders can issue insurance policies in the form of smart contracts. These digital contracts could provide for the collection of premia payments, with policy payments being made automatically depending upon the terms and triggers agreed. Also,

¹⁰¹ Ibid

¹⁰² Nick EXTROPY: The Journal of Transhumanist Thought Szabo, 'Smart contracts: building blocks for digital markets' (1996) 18

¹⁰³ Florian Retrieved May Glatz, 'What are smart contracts? In search of a consensus' (2014) 20 2017

¹⁰⁴ Kristian Lauslahti, Juri Mattila and Timo Etna Reports Seppala, 'Smart contracts—How will blockchain technology affect contractual practices?' (2017)

¹⁰⁵ Jakub J Szczerbowski, *Place of smart contracts in civil law. A few comments on form and interpretation* (2017)

it is possible to reinsure and transfers the insurance because the smart insurance contract in distributed ledger could be groups of standard contracts.¹⁰⁶ The insurance markets were considered to be ripe for disruption, with insurance being referred to as the next frontier for FinTech because of the convenience and low cost of smart contracts.¹⁰⁷

(7) Regulation Technology (RegTech)

Regulatory technology refers to the use of information technologies (IT) for regulatory and supervisory purposes. RegTech can assist both internal firm conduct and misconduct, surveillance, and penalties, as well as external forward-looking supervisory and early intervention action by regulatory authorities. The relevant technologies include but not limited to, pattern analysis, big data analysis, predictive coding, biometrics,¹⁰⁸ Artificial Intelligence (AI), machine learning,¹⁰⁹ Natural Language Processing (NLP),¹¹⁰ Cloud Computing,¹¹¹ and blockchain.¹¹²

The innovation from the UK is the sandbox, which has been imitated by many countries. The regulatory sandbox allows businesses to test innovative propositions in the market with real consumers.¹¹³ The sandbox is open to firms that require authorization and technology

¹⁰⁶ Norton Rose Fulbright, 'FinTech and disruption in the insurance market' (October 2015) Available <http://www.nortonrosefulbright.com/knowledge/publications/133043/FinTech-and-disruption-in-the-insurance-market>

¹⁰⁷ 'The insurance industry is begging for disruption.' 'Insurance Is The Next Frontier For FinTech' TechCrunch (5 August 2015) available <https://techcrunch.com/2015/08/05/insurance-is-the-next-frontier-for-FinTech/>.

¹⁰⁸ For identity verification and fraud prevention, biometric technology such as fingerprint recognition, facial recognition, or voice recognition are employed. This technology is often used in Know Your Customer (KYC) and AML procedures.

¹⁰⁹ AI and ML are often used for risk management, anti-money laundering (AML) measures, and fraud detection. These technologies can learn from data over time, improving their ability to identify fraudulent transactions, unusual activity, or patterns that might suggest compliance issues.

¹¹⁰ NLP helps in understanding and interpreting human language in a valuable way. It is particularly useful in compliance for tasks such as scanning documents to identify relevant information, interpreting complex regulatory documents, or monitoring communications for potential compliance breaches.

¹¹¹ RegTech often uses cloud technologies for data storage and analysis. The cloud allows firms to scale their data storage needs and enables remote access, which is important for firms operating in multiple jurisdictions.

¹¹² UK Government Chief Scientific Adviser, FinTech Futures – The UK as a World Leader in Financial Technologies (March 2016) 5.

¹¹³ Financial Conduct Authority, 'Regulatory sandbox' (2015) online < <https://www.fca.org.uk/publication/research/regulatory-sandbox.pdf> > (last accessed 1 October 2016)

businesses that are looking to deliver innovation in the financial market.¹¹⁴ There are five criteria for firms who want to enter the sandbox system: in scope (whether the need to provide regulated business in UK market or support innovation), genuine innovation (the innovation is a new product or completely different), consumer benefit (whether innovation is consumed directly or through fierce competition brings good prospects of identifiable benefits to consumers), need for a sandbox, and ready for testing. FCA will provide some informal guidance to the testers., and as long as the tester is in contact with the FCA, the supervisory authority can accept unexpected problems and will not punish the tester for them.

(8) Securities and Investment (SecTech or TradeTech)

With the dematerialization of many stocks and bonds, the securities sector has been fully digitized. The main application of FinTech in Securities is an investment management and market infrastructure. Among the four financial technologies of blockchain,¹¹⁵ artificial intelligence,¹¹⁶ big data,¹¹⁷ and cloud computing,¹¹⁸ the application of artificial intelligence is the most popular, and the technology develops the fastest; cloud computing and big data are more commonly used in the securities industry; blockchain is just in its infancy.

Security Technology (SecTech) can be used for Fraud Detection and Prevention. For example, using AI and machine learning algorithms, SecTech tools can identify unusual patterns in transaction data that could suggest fraudulent activity. Besides, it can help with the identify verification, since it can use biometric technology (facial recognition or fingerprint scanners) to recognize the right customer.

¹¹⁴ The sandbox can offer these services: test product quality and service in a controlled environment; reduced time-to-market at lower cost; build appropriate consumer protection safeguards into new products and services; better access to finance.

¹¹⁵ For example, China's GF Securities launched a blockchain-based ABS product custody platform called "Trusted Cloud" in 2018, hosting a 7.3 billion asset management product. At present, "Trusted Cloud" has two capabilities: one is a universal data model, which can support different types of basic asset data; the other is a tamper-proof, traceable blockchain signature mechanism.

¹¹⁶ For AI applications, it is mainly an integrated upper platform, such as intelligent customer service system, intelligent investment advisory platform, intelligent voice assistant, compliance quality inspection, serving the application scenarios of various departments of the company.

¹¹⁷ Through big data technology that securities companies can effectively collect and process internal and external data of the company, conduct mining and analysis of data, give play to the value of data, and provide data support for operation management and risk control, thereby improving the scientific and efficiency of decision-making.

¹¹⁸ The Cloudy Computing is mainly used to capture market signals to place orders under conditions, or various data tool applications that assist investment decisions, such as similar candlesticks, intelligent timing.

In general, FinTech innovation has had a significant impact on the securities industry, which is mainly reflected in four aspects: first, to promote the acceleration of the digital transformation of securities companies;¹¹⁹ second, to promote the full integration of financial services into the scene ecology;¹²⁰ third, to promote the "internalization" of securities companies cross-border development;¹²¹ fourth, to promote the development of RegTech and FinTech innovation to maintain a dynamic balance.¹²²

The Trade Technology (TradeTech) refers to the use of technology to enhance trading in financial markets. It can include the algorithmic trading, robo-advisors, social trading platforms, trading platforms and Apps and Market Analysis Tools. For example, traders use complex algorithms to execute trades at high speeds, often in response to market conditions that humans can't process quickly enough; Robo-advisors are automated platforms that use algorithms to manage and rebalance investment portfolios, often with little or no human intervention. The Social Trading Platform allow users to follow the trading strategies of experienced traders, make it easier for less experienced traders to make informed decisions. TradeTech also includes the software platforms and apps that make it easy for individual investors to buy and sell assets, including stocks, bonds, and cryptocurrencies. TradeTech can also involve the use of AI and machine learning to analyze market trends and generate insights that can inform trading strategies.

(9) Government Services (GovTech)

Compared with other fields, the combination of technologies and government services is still in the trial stage. From the UK government report, FinTech will promote leadership and capability, investment, demonstrator development, optimum regulation, integrity, security and privacy standards production, identification and authentication protocol construction, application trials, and capacity and skills promotion.¹²³ Since the distributed ledgers cannot be easily tampered

¹¹⁹ Bei Zhang, 'The application and influence of FinTech innovation in the securities industry', Modern Business Magazine, (2020).

¹²⁰ Ibid

¹²¹ Ibid

¹²² Ibid

¹²³ MGCSA Walport, 'Distributed ledger technology: Beyond blockchain' (2016) 1 UK Government Office for Science 1

with, it can help increase government transparency.¹²⁴ Distributed ledgers could assist strengthen international aid provision, in particular, through the production of new digital coins with double-spending avoided, and expenditure managed.

To be specific, GovTech can cover a wide range of applications like Digital Services, Data Analytics, Smart Cities, Digital Identify, E-governance and Civic Tech. For example, governments are moving more and more services online, making it easier for citizens to pay taxes, apply for licenses, or access other services without needing to visit a physical office. This can also include the development of mobile apps for easy access to these services; Governments collect vast amounts of data, and data analytics can help them understand and use this information more effectively. This could be used to inform policy decisions, monitor and manage public resources, or provide better services; The Smart Cities refers to the use of technology and data to create more efficient and livable urban environments. This can include everything from intelligent traffic management systems to smart grids and infrastructure monitoring; besides, Governments are working on creating secure digital identity solutions that can help citizens authenticate themselves online. This can improve the security and accessibility of digital services; the E-governance includes technology that helps governments operate more efficiently and transparently, such as automating routine tasks, improving document and workflow management, or providing better tools for communication and collaboration; the Civic Tech often overlaps with GovTech and includes technology designed to promote greater civic engagement, such as platforms that enable citizens to communicate with their elected representatives, participate in public consultations, or otherwise engage with the political process.

3.2 Market Technology Approach

Market Technology Approach refers to the classification of FinTech according to the type of technology. The market technology approach is a perspective used to categorize and understand FinTech based on the targeted segment of the financial market and the technology employed. Instead of looking at FinTech companies based solely on the specific financial service they offer

¹²⁴ This could be used to manage payments by HM Treasury (HMT) and the Department for Work and Pensions (DWP) including in connection with tax collection and welfare support delivery. In China, it might can help track and record the funding trend of large-scale government projects, and can prevent funds from being misappropriated or corruption.

(e.g., lending or payments), this approach combines both the target market and the type of technology used to create more nuanced classifications.

As discussed in the previous sections, the main technology of FinTech includes: blockchain, big data analysis, Artificial Intelligence and Cloud Computing. According to UK's government report, the blockchain is the technology for digital currency and has the potential to replace traditional currency, by extension, the need for central banking and regulatory system.¹²⁵ Also, the Distributed Ledger Technology (DLT) systems can be used for mobile payments and P2P application. The big data can be used for optimization and fusion. The Cloud Computing can solve big data issues in a fraction of the time that even today's massively scalable supercomputer cannot achieve.

(1) Digital Currencies and Blockchain

There is no central clearing required for digital currencies like Bitcoin with its near-instant, near-free international value transfer over the Internet. Due to the lack of central and regulatory systems, Bitcoin and other digital currencies can be unpredictable, but if they were widely adopted, they would pose a major challenge and raise taxation and regulatory questions.¹²⁶ Furthermore, Bitcoin poses the risk of facilitating money laundering and funding illicit activities. For example, the Silk Road that can use Bitcoin payments for drugs and prostitution. Silk Road was an online black-market platform, best known as a platform for selling illegal drugs. It was launched in 2011 and operated as a Tor hidden service, which meant it could be used anonymously and securely without potential traffic monitoring. The transactions on Silk Road exclusively used Bitcoin, which at that time was a relatively new cryptocurrency that also provided a level of user anonymity.

(2) Machine learning and Cognitive Computing

The Machine Learning and Cognitive Computing are technologies in computer systems that can learn from algorithms, as opposed to simply being programmed to do certain tasks. They can assist the computer to use and leverage massive domain knowledge in context. They also help understanding where computers decipher models and systems and to make semi-autonomous

¹²⁵ Walport MJRtUGOfS, 'FinTech futures: The UK as a world leader in financial technologies' (2015)

¹²⁶ Ibid.

unbiased advice decisions. Based on that, the computers can offer new insights and new value. New wealth management and financial advisory capabilities will provide clients with proactive, personalized advice to achieve their goals. Financial analysts and advisors can leverage each new piece of information to transform risk management by evaluating all instances against approved policies and procedures.

(3) Big Data Analytics, Optimization and Fusion

The term "big data" refers to the data generated from online transactions, videos, emails, audios, pictures, click streams, logs, posts, search queries, health record, social networking interactions, science data, sensors and their applications.¹²⁷ The data stored in databases are experiencing exponential growth, which introduces significant challenges for conventional database software tools in effectively capturing, structuring, storing, managing, disseminating, analyzing, and visualizing this data.¹²⁸ New businesses are emerging due to new insights and the cross-referencing of information as storage costs drop and analytic software becomes faster. The Data-centric computing, Data management and Application programming interfaces (APIs) are the core content for Big Data Analytics. Today, data plays a major role in computing, with persistent peta-scale data in memory, volumes and speeds unimaginable a decade ago. This led to data scientists reinventing and creating new data structures to deal with real-time data. It is time for the era of structured databases to come to an end. It is time to define data and clean it as it is used. Data lakes are being created where data is stored in its native format until it is needed. A vast amount of data is stored in the cloud, and there are a variety of analytics available. Introducing application programming interfaces (APIs), which are transforming the way products and services are developed and delivered to consumers and businesses alike.¹²⁹ They offer new brand exposure, new revenue streams, as well as new distribution and affiliate models, as well as new opportunities for brand exposure and revenue generation.

¹²⁷ Seref Sagioglu and Duygu Sinanc, *Big data: A review* (IEEE 2013)

¹²⁸ Ibid

¹²⁹ Sophia Y Wang, Suzann Pershing and Aaron Y Lee, 'Big data requirements for artificial intelligence' (2020) 31 *Current opinion in ophthalmology* 318

(4) Mobile Payments

Digital (not just mobile) payments are driving change, from contactless payment systems to the new like Apple Pay, Google Pay, Alipay and WeChat pay. Mobile payment refers to a money payment made for goods or services through a portable electronic device such as a smartphone or tablet.¹³⁰ This form of payment method is typically conducted via a mobile payment app. These apps are often linked to a user's bank account or credit card, or they can be pre-loaded with funds. When it comes to considering new technologies that improve fraud protection and provide greater convenience for customers, customer experience is now at the forefront. A wearable or even haptic technology could provide opportunities and speed up transactions in the long term.

Currently, different mobile payments system has their own different application scenarios. For instance, Apple Pay is available on Apple devices. Users can store their credit or debit card information on their iPhone, Apple Watch, or iPad and use these devices to make secure contactless payments at physical stores, online, or within apps. Google Pay is similar to Apple Pay and is a digital wallet platform developed by Google for Android devices. It allows users to make payments with Android phones, tablets, or watches. Venmo is a little bit different since it not only allows users to transfer money to others but also allows them to splitting bills with friends such as for a restaurant meal or shared living expenses. WeChat Pay and Alipay are payment systems which are popular in China. They're integrated into WeChat and Alibaba respectively. They cover all aspects of daily life of Chinese users. They can not only be used for inter-user payments, transactions between users and merchants, but also provide users with functions such as paying water and electricity bills, purchasing insurance, and paying for public transportation.

(5) Peer-to-Peer (P2P) Applications

P2P applications allow direct interactions between individuals without the need for a centralized server or authority. This system has many uses, ranging from file sharing to financial transactions. The most well-known use of P2P technology is for file sharing. Programs like BitTorrent allow users to share and download files directly from each other's computers. Each

¹³⁰ Tomi Dahlberg, Jie Guo and Jan Ondrus, 'A critical review of mobile payment research' (2015) 14 Electronic commerce research and applications 265

user in the network, or "swarm", shares a bit of the files they've downloaded, which makes large file distribution more efficient as more users join.

P2P applications are also used in finance to connect borrowers and lenders directly, without the need for a traditional financial institution as an intermediary. In recent years, peer-to-peer lending has emerged as an alternative to traditional bank lending, both for individuals and corporations. Platforms like LendingClub or Prosper allow individuals to lend money directly to other individuals or small businesses. The government is committed to further supporting P2P loan and crowd funding through a package of measures to remove regulatory and tax barriers to their growth. In spite of this, the regulatory environment is still developing, and peer-to-peer businesses are concerned that regulation could deter the crowd from participating.

P2P networks can also be used to distribute streaming video content. Rather than streaming from a centralized server, each viewer shares a bit of the data they've already downloaded, reducing the load on any single server and potentially increasing streaming quality. Besides, some messaging and Voice Over IP (VOIP) services use P2P networks. This includes applications like Skype, which can use P2P networks to transmit voice and video calls directly between users.

4. FinTech advantages and disadvantages

The advent of FinTech has had a significant impact on the traditional financial industry. Its rapid development time is only more than ten years, and many technologies have not yet reached maturity. Therefore, the integration of financial technology and the financial industry has both advantages and disadvantages. The principal advantages can be summarized in terms of increased access, quality, and speed of service at lower cost with greater control and additional security depending upon the specific cryptographic function and options.¹³¹ At the same time, FinTech has also brought many risks to the financial industry, like technology risks and network risks.¹³² This part will introduce the advantages and disadvantages of FinTech.

4.1 Technology perspective

From the perspective of speed, cost, security, and transferability, the technology of FinTech itself is more advanced than traditional financial technology. The continual advancement of digital

¹³¹ G. A. Walker, 'Financial technology law – a new beginning and a new future' (Unpublished 2021).

¹³² Ibid.

systems has outstripped the pace of their analog counterparts, both in terms of speed and capacity. This evolution is largely driven by the persistent upgrading of microprocessors, which has led to an exponential increase in processing speed. Given the fact that a majority of work today relies heavily on computer processors and networks, these digital systems have become not only more efficient but also more cost-effective compared to traditional financial systems. This development is significantly important considering the shifting dynamics in the finance industry, particularly after the 2008 financial crisis. The crisis of 2008 dealt a significant blow to the public's trust in financial intermediaries. It is in this context that FinTech has made an indelible mark. The decentralization feature inherent in some FinTech technologies ensures a higher level of security and is instrumental in re-establishing public trust in the financial sector.

In fact, specific cases such as that of standard insurance smart contracts underscore the role of digitalization in the financial industry. Digitalization not only improves efficiency but also guarantees copy accuracy, which in turn enhances the durability of the product. Thus, it can be concluded that the paradigm shift towards digitization is shaping the future of the financial industry. In addition, digital finance also abandons some of the inconveniences of paper and makes financial products more convenient to circulate and transfer.

Correspondingly, the use of technology in FinTech has made its application and development process more complicated and has also led to the unreasonable use of resources and the problems of excessive dependence. To be specific, compared with original paper or electronic analog double-entry bookkeeping accounts, although digital bookkeeping or algorithms are easier to replicate, they become more complicated at the beginning of the design. For the use, operation, maintenance, and correction, personnel also need more professional training and guidance, which undoubtedly increases the complexity and cost.¹³³ Also, as it has discussed above, although digital systems may have faster processing speeds due to model or design issues, it is likely to cause a lot of waste of resources.¹³⁴ The rapid digitization of the financial industry has also led to excessive reliance on technology. When FinTech devices were allowed to take over

¹³³ This has also led to the fact that more and more financial companies rely on only a small group of professional and technical personnel. Without them, the company will not be able to maintain all systems.

¹³⁴ The validation within Bitcoin relies on the separate processing capability maintained by mining computing. This caused a lot of waste of power resources and chaos in the graphics card market. Therefore, mining behavior has also been criticized.

from more traditional financial instruments or whole sectors, problems will arise. In the event of a FinTech device failure, it may not be possible to return to any previous simple paper or other electronic option.¹³⁵ This over-dependence may lead to systemic paralysis once there is a technical problem that cannot be solved in a short time.

4.2 Business model perspective

The emergence of FinTech has a significant impact on business practices and models. New technologies can have significant impacts on business operations, including in terms of developing innovative new products and services, generating alternative management models and additional revenue streams, producing lower-cost operations, and streamlining organizational structures.¹³⁶ The FinTech solutions can significantly reduce costs and generate a large number of new revenue-generating capabilities, thereby increasing revenue and overall efficiency. At the same time, with the competition between start-ups and existing companies, the development of financial technology has also entered the healthy competition. Companies will compete with each other to develop the most efficient and profitable FinTech solutions. While competing with each other, it will also have an impact on the company's innovation capabilities.¹³⁷ In addition, the advent of financial technology will bring more open access and more cloud services. That is because small start-ups initially had to rely on shared resources, and new digital platforms also operate on a collaborative basis.¹³⁸ Finally, the development of FinTech has also led to the development of related supporting projects. For example, there are digital Incubators, Accelerators, Factories, laboratories, and Catapult services in the UK, and they can provide funding and technology support for FinTech projects.

FinTech is often judged to be disruptive to existing business models. The entry of FinTech is bound to affect existing business structures, extended business relations, competition, and innovation. Many existing financial services has been already disrupted by the new market entrants or the application of new system;¹³⁹ at the same time, the development of FinTech will

¹³⁵ Ibid, (n 129).

¹³⁶ Walport, 'Distributed ledger technology: Beyond blockchain'

¹³⁷ External and internal FinTech development will substantially increase the amount, quality and depth of innovative change in financial product design and service provision.

¹³⁸ Cloud computing involves the provision of scalable and elastic IT capabilities using Internet technologies with the most common form being referred to as Infrastructure as a Service (IaaS).

¹³⁹ An obvious example is the traditional payment system. Mobile payment greatly improves the experience of traditional payment. It changed the user's usage habits, and even replaced part of the traditional payment method.

also lead to the development of extended links and more complex product supply chains;¹⁴⁰ the emergence of many supporting industries related to FinTech will form a fragmented and complex market. Financial companies will therefore also establish a wide range of new business relationships, which will place higher requirements on supervision. In addition, how to balance the negative conflict of innovation and regulation is also a question worth considering. Regulatory and competition obligations must also be properly balanced to promote high degrees of both innovation and market stability.¹⁴¹ For example, it is necessary to achieve a balance between licensing and supervision between new FinTech companies and existing financial companies to ensure market control and supervision, as well as a balance of innovation and advantages.

4.3 Users and stakeholder's perspective

In general, because FinTech let the players in the industry continue to compete, it has also benefited users or related stakeholders. To be specific, this kind of competition has brought them more choices and better service quality.¹⁴² A related improvement is the use of access channels, and new application interfaces (APIs) will also increasingly allow customers to move from one service and platform to another, which will again increase the overall depth;¹⁴³ as discussed before, the emergence of new technologies will inevitably lead to the unemployment of some industry workers, but at the same time it will also generate many new employment opportunities in the design or management of new FinTech companies and projects. In addition, the transformation of the market will also expand the market for related education and training, and more professional and high-quality labor will appear in this field.

As discussed earlier in the technical debate section, although FinTech has dramatically improved the user experience, it inevitably extends its tentacles to the privacy of users. Therefore, consumer protection and corporate ethics are all issues worthy of concern and reconsideration. In the area of identification and authentication, FinTech companies must be able to ensure that customer identity will not be abused, and authorization will not be misused. Similarly, the

¹⁴⁰ Many existing business models had to be updated and modified, and even some business models were unable to operate as a result. Therefore, many areas of business and management research, strategy, and modeling may need to be revised.

¹⁴¹ Ibid, (n 129)

¹⁴² For example, start-ups and incumbents have to focus on customer service quality and support to attract more customers; Banking and financial customers will receive substantial benefits, especially on a mobile basis, providing quality services through new applications and digital platforms

¹⁴³ George, (n 129)

company should also ensure that it can correctly identify the user's legal capacity and whether he has the corresponding authorization.¹⁴⁴ Even more challenging is that it is difficult for users to ensure that the personal information submitted to technology companies will not be abused or stolen.¹⁴⁵ Accordingly, this puts forward higher requirements for consumer protection. From a national perspective, legal provisions must be established to protect consumers. The improvement of corporate ethical standards also requires appropriate governance arrangements and the establishment of industry standards.¹⁴⁶

4.4 Globalization perspective

The advantages that FinTech brings to the globalization process are apparent. FinTech has promoted the development of virtual markets and promoted the exchange of goods and services. After the financial crisis, due to countries in order to prevent the chain reaction of systemic risks, the progress of globalization has slowed down. FinTech can provide new solutions based on the ever-expanding Internet foundation in the procurement and supply chain of goods and services.¹⁴⁷ FinTech can also speed up capital flows because it can improve cross-border payments and foreign exchange. More convenient transactions and payment methods can transfer capital to new investment opportunities, thereby generating more wealth on a global scale. Correspondingly, it is conducive to the expansion of international financial centers.¹⁴⁸ For example, the growth of FinTech has immensely helped China's position in the international financial market, and its related financial sectors such as lending, investment, and insurance have also been greatly improved.

The globalization trend brought about by FinTech is bound to bring potential damage to trade and services, capital stability, and regional competition.¹⁴⁹ The FinTech disruptive feature might damage associated trade and service activities especially in the area like national and cross-border payment flows. This may also indirectly or indirectly damage the competitive

¹⁴⁴ For some transactions, online service providers have to conduct additional review mechanisms to ensure that users have civil capacity and corresponding permissions. Similar cases have occurred in China. Because underage users do not have the capacity for civil conduct, the resulting transactions are also deemed revocable, which will increase unnecessary burdens on the company.

¹⁴⁵ Users are in a naturally disadvantaged passive position on this issue, and once privacy and personal information are stolen or abused, any remedial measures are difficult to restore to the situation before the infringement.

¹⁴⁶ Since ethical standards will continue to change with the expectations of society and people, relevant industry associations and organizations should also participate in constantly updating and revising corporate ethics standards.

¹⁴⁷ Thomas Philippon, *The FinTech opportunity*, 2016)

¹⁴⁸ Rébecca Menat, 'Why we're so excited about FinTech' (2016) *The FinTech book: The financial technology handbook for investors, entrepreneurs and visionaries* 10

¹⁴⁹ Rory Van Loo, 'Making innovation more competitive: The case of FinTech' (2018) 65 *UCLA L Rev* 232

position of other trade and service sectors¹⁵⁰. Also, higher capital popularity requires better management and monitoring of payment transaction systems. The instability of the payment system will have a knock-on effect on goods and services around the world. Therefore, appropriate alternatives are needed to prepare for emergencies. Additionally, competition and recession always complement each other. Under the competition that all countries are eager to protect and develop, the competitive advantages and financial centers of other countries may be harmed by the prosperity of financial technology in other regions.

4.5 Governance and regulation perspective

One of the significant uses of FinTech is to enhance supervisory capabilities. FinTech can not only be used to assist risk management and risk control within financial institutions but also the supervision of companies by the authorities and wider market and system. Specifically, FinTech makes the regulatory obligations to precisely match specific risks, provide guarantees in terms of capital or liquidity, and limit debt or leverage levels. For example, FinTech regulation can impose some experience reporting obligations for banks, securities, and insurance companies with the assistance of Basel III. Also, FinTech can help companies automatically comply with regulations.¹⁵¹ For example, FinTech (regtech) can allow the company to automatically comply with new reporting requirements or prompt the trigger rate in the new compliance system. Compliance could become considerably more automated, automatic, and autonomous. Therefore, supervision can be transformed from static in the past to a more precise, almost real-time monitoring method.

Correspondingly, in terms of market and institutional supervision, market integrity, relevant laws, and market access, new requirements for the supervision of financial technology activities have to be put forward. Due to the complexity and frontier nature of FinTech activities, the pace of regulatory authorities may lag behind the development of financial activities. As for market integrity, regulators need to ensure that FinTech platforms and activities do not facilitate insider trading and market abuse.¹⁵² At the same time, this also requires countries to ensure that they

¹⁵⁰ Ibid.

¹⁵¹ Douglas W Arner, Janos Barberis and Ross P Buckley, 'The evolution of FinTech: A new post-crisis paradigm' (2015) 47 *Geo J Int'l L* 1271

¹⁵² For example, for digital currency trading platforms, regulators need to ensure that they can operate safely, will not become the soil of crime, and will not facilitate money laundering and terrorist financing.

have the necessary laws and regulations to manage FinTech activities. For example, the laws and regulations on privacy and the protection of personal information mentioned above. For some key and fast-developing technologies, regulators need to constantly maintain, eliminate defects, and revise them so as to ensure that they can keep up with the pace of financial technology development. This may be due to the consideration that the impact of disruptive technology will have an unstable impact on the market.

Finally, a question worth considering is that in some countries or regions where the availability of bank accounts is low, although financial technology can help the digitalization process reduce transaction costs, a considerable number of people still cannot obtain or include these digital services. This exclusion may be caused by the digital divide,¹⁵³ or it may be a natural distrust of the digital system. Therefore, this might be referred to as a form of cash retention or market retention policy, and it should also be considered when supervising and managing the financial technology market.

5. ICO opportunities

5.1 The underlying technology of ICO and related debates

Since FinTech integrates existing technologies into the financial field, the technologies involved in FinTech include but are not limited to Cloud, Big Data Analytics, Robo-Advisor, Mobility, Blockchain, Internet-of-Things, advanced sensors, machine learning, drones, and advanced algorithms.¹⁵⁴ With the continuous development of science and technology, more technologies will be integrated into payment, consulting services, financing, product innovation, and business model innovation in the future. Due to the objective of this dissertation and current development dilemma of Green Finance, it is difficult to obtain funds from private channels, especially for start-ups, and ICO can solve this problem to a large extent. Therefore, this research will only focus on the ICO and its application in the Green Finance.

¹⁵³ Refers to the information gap and further polarization between different countries, regions, industries, companies, and communities in the global digitalization process due to differences in the degree of ownership, application, and innovation capabilities of information and network technologies trend.

¹⁵⁴ Kelvin Leong and Anna Sung, 'FinTech (Financial Technology): what is it and how to use technologies to create business value in FinTech way?' (2018) 9 International Journal of Innovation, Management and Technology 74

(1) Blockchain's history and Mechanism

An ICO, or Initial Coin Offering, is a fundraising mechanism in which new projects sell their underlying cryptographic tokens in exchange for bitcoin, ether, or other cryptocurrencies. It's somewhat similar to an Initial Public Offering (IPO) where investors purchase shares of a company, but in an ICO, investors buy tokens of a new cryptocurrency or a token that has a specific utility in a new project. As the name implies, a blockchain is a series of linked blocks, each of which contains several transactions or some other information. Blockchains are noncentralized, reliable, and difficult to fraudulently use forms of database storage.¹⁵⁵ This method provides a decentralized, immutable form of data that can be used across a network of users, create assets, and serve as a shared record for all transactions.¹⁵⁶ There is a great deal of transparency and trust between all parties due to the ease of querying each set of information. As a P2P network of computers, blockchain operates on top of the internet. Identical copies of the ledger of transactions are held by all users.¹⁵⁷ Through machine consensus, P2P value allows us to exchange information without a middleman.

People may have heard of blockchain in the past ten years, but the idea of blockchain can be traced back to the 1980s to 1990s. In 1989, Leslie Lamport developed the Paxos protocol.¹⁵⁸ Then he wrote another paper, "The Part Time Parliament" to ACM (Association for Computing Machinery) transactions on Computer Science.¹⁵⁹ The paper describes the consensus model for reaching an agreement resulting in an unreliable network of computers. In 1991, a chain of information was used as an electronic ledger for signing documents, and none of the signed documents in the collection had been changed.¹⁶⁰ Under the above concept and technology integration, Bitcoin, as the creation of blockchain, came out in 2009. The first paper is written

¹⁵⁵ Pinyaphat Tasatanattakool and Chian Techapanupreeda, *Blockchain: Challenges and applications* (IEEE 2018)

¹⁵⁶ Muniba Memon and others, *Blockchain beyond bitcoin: Blockchain technology challenges and real-world applications* (IEEE 2018)

¹⁵⁷ Ibid.

¹⁵⁸ Paxos protocol is designed to solve consensus in a network of unreliable or fallible processors. Consensus means that in the network agreeing on one result among a group of participants. Blockchain borrowed this approach later.

¹⁵⁹ Leslie Lamport, 'The part-time parliament', *Concurrency: the Works of Leslie Lamport* (2019)

¹⁶⁰ Satoshi Nakamoto, *Bitcoin: A Peer-to Peer Electronic Cash System* (2008), available at: <https://Bitcoin.org/Bitcoin.pdf> (accessed 19 January 2021).

by Satoshi Nakamoto named "A Peer-to-Peer Electronic Cash System," and it provided the blueprint for the following cryptocurrencies.

Bitcoin is not the first electronic currency scheme, but it is the most widespread digital coin. The process of issuing digital currency is ICO, which will be introduced in the section 5.3 and 5.4. The Bitcoin uses the distributed ledgers to achieve the characteristics of decentralization, since all the participants are the recorder of the transactions and no agencies are needed.¹⁶¹ In this decentralized system, no single user could control the electronic cash, and no single point of failure existed. All the transactions happen between the users without a trusted third party, contrary to most existing financial transactions.¹⁶² Also, it can issue new coins in a defined manner to the users who try to publish new blocks and maintain copies of the ledger. These users are called miners in Bitcoin.¹⁶³ There is no need to organize the transactions since the automated payment of the miners could distribute the administration of the system. A self-policing system can be created by using a blockchain and consensus-based maintenance. Another feature of blockchain is that all the users are pseudonymous, but the transactions are publicly visible. Therefore, blockchain enables anyone to anonymously create accounts and take part in the transactions; it can deliver certain trust among parties without knowing each other. It breaks the traditional financial system in that financial transactions require a third party as an intermediary.

(1) Challenges of Blockchain and Digital Currency

The digital currency created by the blockchain, such as Bitcoin, still has many critics. Part of the skepticism is directed at the function of the blockchain itself, such as the transmission speed and anonymity of the blockchain. For example, the maximum transaction throughput of Bitcoin is determined by the block size and the block interval.¹⁶⁴ With a block size of 1MB and an average block interval of 10 minutes, Bitcoin can support a maximum of 7 transactions per

¹⁶¹ Dylan Yaga and others, 'Blockchain technology overview' (2019)

¹⁶² Then central party or third party is replaced by a framework of internal protocols that control the operation of the system and allow the verification of transactions to be performed by the participants themselves. When the payment and transactions are made, the users can get newly minted currency for making the payment process.

¹⁶³ Ibid.

¹⁶⁴ Joshua Lind and others, 'Teechan: Payment channels using trusted execution environments' (2016) p1

second.¹⁶⁵ In contrast, Visa is allowing over 1,736 transactions per second.¹⁶⁶ The transaction speed of the Bitcoin blockchain is a bit slow.¹⁶⁷ Hence, whether Bitcoin needs to be updated and upgraded has become a question that Bitcoin advocates have been discussing for a long time, and since everything is unknown, no one can predict what will happen in the future.

Bitcoin's anonymity is also a controversial issue because, on the one hand, it can protect the privacy of users and transaction information; on the other hand, it may also provide a breeding ground for crimes. Bitcoin has the highest market value among all the digital currencies which is 600,000 million dollars and about 3800 Million dollars transactions value per day.¹⁶⁸ Concerns arise with regard to financial system integrity, especially about money laundering and anti-terrorist financing, which will be discussed more in detail in the regulation section. Also, many cyber-criminals and hackers used Bitcoin for illegal activities. For example, the Silk Road, allows Bitcoin as their payment method to cover the identities of the sellers and buyers.¹⁶⁹ Recently, a computer ransom-ware named WannaCry and Petya accepted Bitcoin as the payment from the computer's owner to unlock their machine.¹⁷⁰ Therefore, many countries like China have also closed Bitcoin transactions or directly identified Bitcoin as an illegal currency.

For the decentralization nature of blockchain and Bitcoin, its immutable nature is determined by computing power. Due to the distributed ledger method, all users are bookkeepers. The way to verify the correctness of the records is to adopt the method of "follow the longest chain."¹⁷¹ Therefore, once a group has enough miners or computing power, it will have the opportunity to

¹⁶⁵ Ibid

¹⁶⁶ 'The Trust Machine' The Economist (London 6 November 2015). See also 'Money from Nothing' The Economist (London 15 March 2014); 'The Magic of Mining' The Economist (London 10 January 2015).

¹⁶⁷ Even if Bitcoin is completely unimpeded, it takes about ten minutes to complete each transfer now. According to this, the current method for Bitcoin modification is to expand the capacity of the block. BCH (Bitcoin Cash) is the product of Bitcoin fork, which means copy and modify. The capacity of BTC block is 8 MB. This kind of forking runs counter to the immutable nature of the blockchain, so it is still controversial.

¹⁶⁸ Coindesk, < <https://www.coindesk.com/> > accessed at 4th July 2023.

¹⁶⁹ Yining Hu and others, 'Characterizing and detecting money laundering activities on the bitcoin network' (2019)

¹⁷⁰ WannaCry has affected more than 200,000 computers in 150 counties, was traced back to North Korea. NotPetya, it is estimated to have cost logistics specialists such as Maersk and FedEx as much as \$300 million each, and it was blamed on Russia.

¹⁷¹ The real code rule in blockchain is to follow the longest chain. For example, if there are two miners A and B are looking for ways to pack new blocks. If they found a new block (which means they get one Bitcoin) at almost same time, the system will broadcast the news to the users, and some of the users get the news that A found a new pack, others receive the new that B found the new pack. The two groups of users will continue to count according to the new blocks they receive. If broadcast tell the users that A found a new pack again, so the chain of A is longer than B. All the users will take A's chain as the correct one and B is failed to mine.

tamper with the records of the blockchain.¹⁷² For the current stage, 51% of attacks on some cryptocurrencies seem out of reach because the total amount of computing power that can be rented on NiceHash (a website you can buy mining power) is not enough to match the computing power of the entire network.¹⁷³ However, if NiceHash doubles the scales of their computing power rental, then cryptocurrency like Ethereum (ETC, currently value ranked 18th) is vulnerable to get an attack.¹⁷⁴ In addition, with the continuous development of the computer industry, the emergence of quantum computers provides the possibility for greater computing power. Recently, PsiQuantum is building an ultra-powerful commercial computer-based on photonics by the middle of this decade.¹⁷⁵ Once the quantum computers are finished and put into commercial user, especially in mining, it may have a significant impact on virtual currencies.

Another issue is about wasting electricity for mining Bitcoin. According to Satoshi Nakamoto, the process of a constant amount of new coins is analogous to gold miners expending resources to add gold to circulation. In the Bitcoin case, it costs CPU time and electricity.¹⁷⁶ With the continuous in-depth research on mining machines, The miners found that compared to the high price of the CPU, the GPU of the graphics card is a more suitable mining calculation tool because it has a large amount of memory available for pure computing.¹⁷⁷ It causes price hikes and shortages of many high-end graphics cards.¹⁷⁸ More importantly, Bitcoin mining is a very power-consuming job. It is estimated about 133.39 TWh (Terawatt-hour) was used for Bitcoin Mining every year.¹⁷⁹ Its electricity consumption throughout the year is equivalent to the

¹⁷² Satoshi Nakamoto (n 16).

¹⁷³ Once the computing power reach 51%, blockchain will face the problem of ‘double spending’, which means users can spend the same money at least twice.

¹⁷⁴ There are some possible ways to respond to attacks. For Cryptocurrency Exchanges, they can extend withdrawal and deposit deadlines and improve account verification security. However, extending the withdrawal time could also arouse the anger of users, since no one wants to wait more time to withdraw their currency. For the cryptocurrency, they can put their project on safer and larger scale of blockchain network like ERC-20.

¹⁷⁵ Clive Cookson, ‘PsiQuantum expects commercial quantum computer by 2025’, Financial Times, (2021) <https://www.ft.com/content/a5af3039-abbf-4b25-92e2-c40e5957c8cd> accessed at March 13 2021

¹⁷⁶ Satoshi Nakamoto (n 16)

¹⁷⁷ Nowadays, most of the hardware used for mining is GPU or special mining customized mining machine such as ASIC. ASIC is Application-Specific Integrated Circuit, it is an integrated circuit (IC) chip customized for a particular use, rather than general purpose use. It can be designed specifically for mining, so it can save costs.

¹⁷⁸ Larry Dignan, ‘Nvidia launches CMP, cryptocurrency mining processor, may alleviate gaming chip shortages’, (2021) ZDNet <https://www.zdnet.com/article/nvidia-launches-cmp-cryptocurrency-mining-processor-may-alleviate-gaming-chip-shortages/> accessed at March 13rd 2021

¹⁷⁹ Cambridge Center for Alternative Finance, ‘Bitcoin network power’ (2021) < <https://cbeci.org/> > accessed at March 22nd 2021

electricity consumption of Sweden in one year.¹⁸⁰ This is just the electricity consumed to mine Bitcoin, and there are other digital currencies that are also being mined day and night.¹⁸¹ Whether such massive power consumption is essential to waste mining digital currencies has become the focus of controversy.¹⁸² Therefore, mining Bitcoin is also considered a waste of environmental resources. As to whether Bitcoin is worth mining and whether the benefits it brings to people are proportional to the wasted electricity, the answer can only be found after the wave of Bitcoin mining has passed.

¹⁸⁰ Cambridge Center for Alternative Finance, 'Country ranking, annual electricity consumption' (2021) <<https://cbeci.org/cbeci/comparisons>> accessed at March 23rd 2021

¹⁸¹ In order to save electricity costs, large-scale mining machines are located in China because of the low electricity prices in China. More than 90 percent of the pools are from China. See at <https://explorer.viawallet.com/btc/pool?tabs=4>

¹⁸² David Gerard, *Attack of the 50 foot blockchain: Bitcoin, blockchain, Ethereum & smart contracts* (David Gerard 2017)

5.2 ICO structures

Offering structures for digital coins and tokens can be classified into several types. Similar to crowdfunding, some ICOs have a private pre-sale or are entirely private. ICOs can be conducted without issuing coins or tokens (a 'NoICO'), although this is generally not the case unless there is a large number of separate private investors.¹⁸³ The "coin" in an ICO refers to a coin or a token that the project creates and offers to investors. These coins or tokens typically grant the holder some rights within the project's ecosystem. The rights may include: access right, revenue sharing, voting rights, asset representation.

There are different structures of ICOs, the main types of offerings are ICO, Security Token Offering (STO), Equity Token Offering (ETO), Utility Token Offering (UTO), Initial Supply Auction (ISA), Interactive (IICO), Airdrop and Bounty.¹⁸⁴ The ICO as has been introduced before, allows the purchase of the coin or token generally in exchange for one or more of a limited number of other principal cryptocurrencies;¹⁸⁵ the STO offers investors assets backed by the platform's cash flow or profits, generally in compliance with domestic securities laws;¹⁸⁶ With an ETO, the investor acquires equity interest equivalent to a corporate share, and the issuance is again carried out in compliance with local securities laws;¹⁸⁷ in an UTO, investors receive an entitlement to purchase goods or services through the platform upon completion;¹⁸⁸ An ISA determines the market price of real estate through descending prices, resulting in purchasers acquiring assets at fair market value; IICO is a smart contract to manage the allocation using fund withdrawal, withdrawal locks and inflation ramps over a specific period such as with a 30-day crowd sale.¹⁸⁹ For purposes of customer loyalty, marketing and awareness, AirDrop (token offering) is a free distribution of coins or tokens to a defined group, usually

¹⁸³ GA Walker, 'Initial coin offerings—technology and the rule of law' (2019) 2019 Rule of Law and Anti-Corruption Center Journal 7

¹⁸⁴ G. A. Walker, 'Initial Coin Offering – Technology and the Rule of Law' (Unpublished 2020).

¹⁸⁵ Ibid

¹⁸⁶ Ibid

¹⁸⁷ Ibid

¹⁸⁸ Ibid

¹⁸⁹ Simple Agreement for Future Token (SAFT) permits investors to receive a discounted utility token at a subsequent date. SAFT was based on the original Simple Agreement for Future Equity (SAFE) and was developed by Marco Santori at Cooley LLP. The SAFT constitutes an investment contract with registration with the SEC and initial sale to accredited investors.

early coin adopters; A bounty token is a free token offered as a reward for meeting a specific requirement, either pre-ICO or post-ICO.

These different structures of ICOs assumes different functions and roles in different scenarios. Therefore, the regulatory requirements for them will be correspondingly different. The structural identification of ICOs in China and the UK will be discussed in Chapter 5.

5.3 ICO financing process

ICO is one way for start-up companies to raise capital. It is similar to IPO (Initial Public Offering), but the details are different.¹⁹⁰ The technology behind ICO is blockchain and it is different from traditional accounting methods. Unlike the traditional accounting way, only one or a central accountant will record the transaction information. Every user in the blockchain system is allowed to participate in the information recording process, thereby reducing the participation of intermediaries. IPO is based on the centralized system and it manifested in the following aspects: regulation, underwriting, trading and clearing and settlement. IPOs are heavily regulated by financial authorities. In the UK and China, the regulator is Financial Conduct Authority (FCA) and China Securities Regulatory Commission (CSRC). Companies usually work with investment banks, which act as underwriters for the IPO. These banks help determine the initial offering price of the stock, assist with regulatory compliance, and often guarantee the sale of a certain number of shares. Once the shares are available, they are traded on centralized exchanges, like the New York Stock Exchange (NYSE) or NASDAQ. These exchanges match buyers and sellers and provide a regulated environment for trading. After a trade is executed on an exchange, the transaction goes through a clearing house, another centralized entity that ensures the smooth transfer of securities from the seller to the buyer and the transfer of payment from the buyer to the seller.

Compared to IPO, because ICO is based on a decentralized system, it can help startups to raise large amounts of funding with minimal effort while avoiding intermediary costs.¹⁹¹ In general, the ICO financing process can be divided into three stages: pre-ICO, launching, and post-ICO stage.

¹⁹⁰ The details will be discussed in the section 5.5.

¹⁹¹ Wulf A Kaal and Marco Dell'Erba, 'Initial coin offerings: emerging practices, risk factors, and red flags' (2017) Verlag CH Beck (2018), U of St Thomas (Minnesota) Legal Studies Research Paper

The pre-ICO stage consists of two steps. The first step is announcement, and the startups usually announced the project on the Internet such as cryptocurrency forums.¹⁹² The content of the announcement usually includes executive summary presenting the idea of the project. The announcement aiming to draw attention and get feedback from the digital coin community, which can play a good role in early publicity.¹⁹³ This step is quite important, since it can make an initial impression of the projects on potential investors.

The second step is about issuing White Paper. The startups will issue a White Paper and put on its websites or forums. The White Paper discloses information about the project, similar to the function of a prospectus in the IPO which can provide details about an investment offering for sale to the public. To be specific, the White Paper usually includes the business model, the technical aspects and the source code, the issued token (name, rights, and obligations), the token supply,¹⁹⁴ allocation, and distribution, the way of collecting the capital, and how they will be used, the issuing entities, the law and regulation applicable to the ICOs, the launch of the ICO and its duration, the hard and soft cap and road map (the project's course of development).¹⁹⁵ The White Paper is crucial, because it can build a general market credibility and investors' trust in the soundness of the projects.¹⁹⁶ Many white papers may not contain all of the above but will contain some of the information they want investors to know. For example, in Earthtoken White Paper covers the token sale, token allocation, company information, and information of the team.¹⁹⁷ However, unlike the IPO prospectus, since the ICOs are not as strictly regulated as IPO, the information in the White Paper is unaudited and cannot be verified. This increases the potential risk of misleading customers, and will be discussed in the chapter three.

¹⁹² Moran Ofir and Ido Sadeh, 'ICO vs. IPO: Empirical Findings, Information Asymmetry, and the Appropriate Regulatory Framework' (2020) 53 Vand J Transnat'l L 525

¹⁹³ Ibid

¹⁹⁴ For more details for the concepts in the White Paper see at Section 7.1.

¹⁹⁵ The tokens are promoted as future functional units of currency if or when the ICO's funding goal is met, and the project successfully launches. The tokens can be divided into different types according to its function like security tokens, utility tokens and so on. The source code means the computer program in its original programming language before translation into object code usually by a compiler.

¹⁹⁶ Kaal and Dell'Erba, 'Initial coin offerings: emerging practices, risk factors, and red flags'

¹⁹⁷ Earth Token, 'Earth Token Whitepaper', 2017.

The marketing process of ICOs is more open and simpler than IPO to the public since the issuers of the ICOs can communicate directly with their potential investors through social media platforms without complex procedural requirements. The IPO marketing process usually contains the preliminary prospectus, conducts the road shows, and holds the IPO pricing meetings.¹⁹⁸ In fact, social media plays a vital role in marketing ICOs. According to a survey that every ICO has about eight social media links on its website.¹⁹⁹ Also, 87 percent of ICOs have Twitter accounts with an average of over five thousand members and 22,200 followers.²⁰⁰ These accounts are used to allow the investors to know the updates about the project, and issuers can respond to investors' questions and queries.

Also, the issuers will disclose their underlying code of the tokens on an online code repository,²⁰¹ and by doing this, it can make potential investors pre-access their program code before the ICO.²⁰² It allows the investors to know the project in advance and make the investors believe the project they take part in is reliable. They believe that publishing the underlying code offers a form of transparency to the investors and increase the credibility of the projects.²⁰³ The issuers of ICO will reward the individuals who translated their documents into different languages or fix bugs in the underlying code. In this way, they use the wisdom of the crowd to identify bugs and improve the quality of the project's code. This kind of relationship in which investors can participate in project programming is unique, and investors will have a certain sense of participation and control in the projects. This is also the process of interaction between the project team and public investors.

¹⁹⁸ The roadshow is a sales pitch or promotion made by the underwriting firm and a company's management team to potential investors before going public.

¹⁹⁹ Lauren Rhue, 'Trust is all you need: an empirical exploration of initial coin offerings (ICOs) and ICO reputation scores' (2018) Available at SSRN 3179723

²⁰⁰ Sabrina T Howell, Marina Niessner and David Yermack, 'Initial coin offerings: Financing growth with cryptocurrency token sales' (2020) 33 *The Review of Financial Studies* 3925

²⁰¹ A source code repository, or simply code repository, is essentially a file archive and web hosting facility where programmers, software developers, and designers store large amounts of source code for the software and/or web pages for safekeeping.

²⁰² The code plays an important role in an ICO. Although the blockchain technology is open source, the codes of different scenarios under the blockchain are very different. Different projects require the project developer to write the cataloged code himself. The code of the project is the core technology of ICO financing.

²⁰³ Howell, Niessner and Yermack, 'Initial coin offerings: Financing growth with cryptocurrency token sales'

For the stage of launching ICO and main sale, the ventures will issue the tokens for a predefined period.²⁰⁴ The period can be either fixed in time or capped, uncapped by a predetermined threshold.²⁰⁵ They usually define a hard cap (the maximum amount of funds they aim to collect) or a soft cap (the minimum amount of capital they aim to gather). When the ICO reaches the soft cap, the ICO is considered to be successful. Otherwise, the funds will be returned to the investors. Also, if it reaches the hard cap, the token sale ends. The whole process is made through the project website, and investors are required to transfer their money, or other crypto currencies to a smart contract address, then the smart contract will return transfers token to the senders.²⁰⁶

In the Post-ICO stage, in order to increase the confidence of the investors, some of the tokens will be kept in the smart contracts for a certain period or until the project reaches a specific goal. To keep tokens in the smart contracts refers to the mechanism used often in the cryptocurrency space, particularly during ICOs or token sales, to ensure a certain level of commitment, transparency, and long-term alignment of interests. Keeping the tokens in the smart contract aims to prevent founders from dumping their tokens after the ICO ends. Some of the tokens will be reserved for employees, platforms development, and contributors in the future, and it can help to encourage them to keep working on the ICO. Other tokens will be listed in crypto exchanges platforms and trade in the secondary market.²⁰⁷ In this instance, tokens are similar to stocks, and investors can buy and sell at will on the trading platforms, and the platform will charge a certain fee.

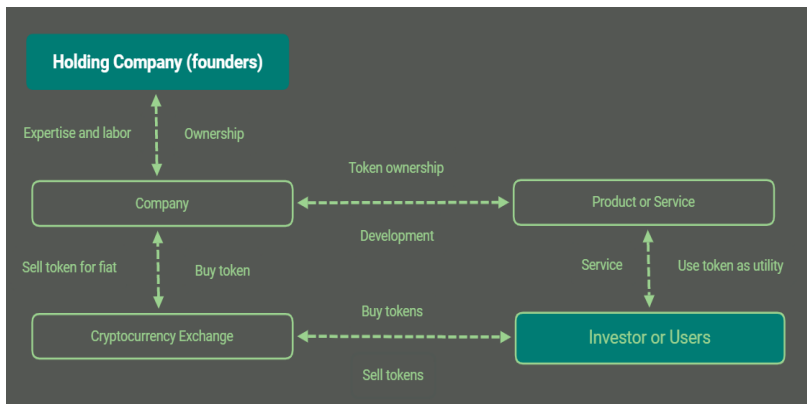
²⁰⁴ Token may have some utility in using the product or service the company is offering, or it may just represent a stake in the company or project. Tokens can be used for investment purposes, to store value, or to make purchases. Cryptocurrencies are digital currencies used to facilitate transactions (making and receiving payments) along the blockchain. Crypto tokens are a type of cryptocurrency that represents an asset or specific use and reside on their own blockchain. The biggest difference between a cryptocurrency and a token is that cryptocurrencies are the native asset of a blockchain like BTC, or ETH, whereas tokens are built on an existing blockchain, using smart contracts.

²⁰⁵ Alexis Collomb, Primavera de Filippi and SOK Klara, 'Blockchain Technology and Financial Regulation: A Risk-Based Approach to the Regulation of ICOs' (2019) 10 *European Journal of Risk Regulation* 263

²⁰⁶ The smart contract address is usually given when a contract is deployed to the Ethereum Blockchain. The address comes from the creator's address and the number of transactions sent from that address.

²⁰⁷ Thomas Bourveau and others, 'Initial coin offerings: Early evidence on the role of disclosure in the unregulated crypto market' (2018) 3193392 Available at SSRN

Diagram 1 shows the relationship between the parties like investors, companies and founders of the ICOs. It is worth mentioning that investors buying tokens directly from the company is the primary market of ICO, while buying and trading through the trading platform is the secondary market for the newly issued (coins or tokens), which has a similar concept in the stock market. The ownership of the company that will lead the green projects and ICO process generally remain with the holding company founders. The exception is when the holding company issue ECO. Investors can get tokens in two different ways. The first is the ICO process, the investors buy the product or service and obtain the token ownership. The second is via secondary market, similar to the stock market. After the ICO, the investors can buy and sell tokens in the exchange platform and pay certain transactions fees to the platform. For example, from the Cryptocurrency exchange platform such as the Earth token from Crypto. The tokens of the platform are also bought from the company that sells tokens for fiat money. If the company provide some products or services, the investors could use tokens as utility and acquire service (such as data storage) or products (such as tokenized real estate). For example, if investors bought the tokens from the exchange platform and they can get the service like entering the electricity trading system built by blockchain technology to buy and sell electricity, or similar carbon emissions trading.²⁰⁸



²⁰⁸ Take Power Ledger as an example, it issues the token Sparkz which are priced, issued and redeemed in the local currency of the platform Participant. Sparkz are a local market level token and are priced for the exchange market they are deployed in, e.g. In Australia 1 Sparkz = 1 cent AUD. They allow for frictionless transacting throughout the FuseBox applications. Sparkz can be used to transact electricity between customers in their home market.

Diagram 1 The process of ICOs

5.4 The differences between ICOs and IPOs

ICOs, as a concept borrowed from IPOs, have some similarities with IPOs. For example, both are also used as a way to raise funds from investors publicly; they also endow investors with certain rights or symbols of rights like ownership of the company, and they can also trade in the secondary market. Analyzing their differences and similarities will help to understand better how ICOs work and their shortcoming. In general, there are three differences between ICOs and IPOs: the right of investors, degree of information disclosure, marketing methods and selling procedures.

First, the investors' rights of ICOs are different from the IPOs, especially the content of the rights is different.²⁰⁹ In IPOs, the shareholders are entitled to ownership rights, dividend rights, and voting rights in the company, and it will depend on the different types of securities issued.²¹⁰ In UK and EU practice, public investors usually have access to shares at the IPO price. However, in an ICO, the right of the investors are depended on the types of the tokens like security tokens, exchange tokens, and utility tokens.²¹¹ The security tokens offer right similar to securities, but it still depends on what kind of specific power the creator wants investors to obtain, such as ownership or partial shares. The function of securities token is similar to securities, but whether it is recognized as securities by regulatory agencies depends on different legal systems and regulations. The exchange tokens play a function similar to currency and reflect exchange value. As for the utility tokens, most of them can only be used within the scope of the company's business, such as tokens for vehicle test drives. Hence, compared with an IPO, the types of rights granted to investors by the ICO token issuance are diverse and are determined by the issuer.

²⁰⁹ Ofir and Sadeh, 'ICO vs. IPO: Empirical Findings, Information Asymmetry, and the Appropriate Regulatory Framework'

²¹⁰ Ibid.

²¹¹ There is currently no unified standard for the classification of tokens. The classification method adopted by the British government is used here. For details, please see at: FCA, 'Guidance on Cryptoassets Feedback and Final Guidance to CP 19/3,' 2019

The second is about information disclosure. The requirement of documents for launching an ICO and IPO is also different. The IPOs in most countries have strict requirements from the regulators. For example, in China, information disclosure documents mainly include prospectuses, prospectuses, listing announcements, periodic reports, and interim reports.²¹² In the UK, the information disclosure requirement set out in Articles 17 (Public disclosure of inside information), 18 (insider lists) and 19 (Manager's transactions) of the UK market Abuse Regulation.²¹³ Also, the FCA Handbook Listing provide more details in Disclosure and Transparency Rules (DTR). These rules aim to ensure that investors receive essential information in a timely manner. This includes rules on the periodic financial reporting, the disclosure of major shareholdings, and the dissemination of regulated information. However, the ICOs' information disclosure requirements are not clear and still depends on the function and governing jurisdiction.²¹⁴ Most of the ICOs will publish a White Paper that contains the basic information of the project, the business model, and the technologies will involve.²¹⁵ At present, there are no uniform or mandatory regulations and requirements for the white paper, so the structure of its content is full of flexibility. However, due to the absence of mandatory information disclosure regulations, the content that investors can obtain is completely determined by the founders themselves, so it might cause the opacity and asymmetry of information which will be discussed in more details in Chapter three.

The third is about the marketing process in the ICOs and IPOs. For IPO, an underwriter will conduct a book-building process.²¹⁶The underwriter plays an important role in the IPO process. It will not only help the companies to prepare to be listed but also contact the investors to cooperate in obtaining registration information in advance.²¹⁷ Besides, they buy the securities

²¹² CSRC, 'Measures for the Administration of Information Disclosure of Listed Companies', 2009. http://www.csrc.gov.cn/pub/newsite/jczd/flfg/200912/t20091218_174612.html accessed June 10th 2021

²¹³ There are also some similar requirements about the disclosure of information in the EU MAD, and it is applied in the UK before the end of the Brexit transition period.

²¹⁴ ORG. ECON. COOPERATION & DEV., INITIAL COIN OFFERINGS (ICOS) FOR SME FINANCING 46 (2019) <http://www.oecd.org/finance/ICOs-for-SME-Financing.pdf> accessed at June 10th 2021

²¹⁵ Ofir and Sadeh, 'ICO vs. IPO: Empirical Findings, Information Asymmetry, and the Appropriate Regulatory Framework'

²¹⁶ The book building is a process by which an underwriter tried to determine the price at which an IOP will be offered. The underwrite for most circumstances are investment banks which builds a book by inviting institutional investors to submit bids for the number of shares and the price they would be willing to pay for them.

²¹⁷ Murat M Binay, Vladimir A Gatchev and Christo A Pirinsky, 'The role of underwriter-investor relationships in the IPO process' (2007) 42 *Journal of Financial and Quantitative Analysis* 785

in advance and contact prospective investors afterwards. That is because they are looking for investors to whom they can sell the securities ought from the issuer.

The ICOs marketing is mainly relies on social media, which is not included in the scope of regulation compared to IPO.²¹⁸ It generally starts with social media to put the projects and try to attract target investors. Founders also launch announcements to communicate directly with investors. It is quite different from IPO, the issuer or the founder of the projects launches and communicates with their investors translates into investor-investee relationships and regulated by the law. Most securities marketing are through securities companies, thus, the whole process will be strictly regulated by law. These securities companies have the memberships of the stock exchange, and can underwrite the issuance, participate in proprietary trading, or both proprietary trading and agent trading of the securities. For most of the investors, they do not have an opportunity to communicate with the owner of the company.²¹⁹ For the marketing stage, ICO is more flexible and proactive than IPO. The holding company, which is also the marketing company, has more autonomy to decide how to communicate and when to communicate with its own investors.

Fourth, when selling the securities and tokens, one main difference is the involvement of intermediary. In an IPO, investment banks play a crucial role as intermediaries. They underwrite the IPO, which means they take on the risk of buying the shares from the company and selling them to the public. They help determine the price of the shares, create the prospectus, and often guarantee the sale of a certain number of shares. In an ICO, tokens are typically sold directly to the public without the involvement of an intermediary like an investment bank. The sale usually happens on the project's website or a specific crowdfunding platform. ICOs are typically marketed through cryptocurrency forums and online communities, and buyers can purchase the tokens using cryptocurrencies like Bitcoin or Ether.

Moreover, IPOs and ICOs require different lengths of time to raise funding and launch the offering. In the ICO, the cost is lower and can raise funding from all over the world.²²⁰ In IPOs, the issuers have to demonstrate a proper amount of revenues and profits, which can only be

²¹⁸ Ibid (n 17)

²¹⁹ Ibid

²²⁰ Mohammad Hashemi Joo, Yuka Nishikawa and Krishnan Dandapani, 'ICOs, the next generation of IPOs' (2019) *Managerial Finance*

achieved after a company has reached a certain level of maturity.²²¹ The maturity is like requirement for IPO go public, there are hard and soft requirement for an IPO and vary with jurisdictions. For example, in the UK, FCA requires at least three years of operations with audited accounts as a prerequisite to an IPO.²²² As for ICOs, since issuers can raise funding outside the traditional capital market and even from other countries and there are no underwriters and traditional exchange involved, they can start at a very early stage without restriction.²²³ Therefore, in general, ICOs are less regulated than the IPO process, which is more standardized and subject to strict regulation and this will be discussed in the Chapter five and six.

²²¹ Collomb, de Filippi and Klara, 'Blockchain Technology and Financial Regulation: A Risk-Based Approach to the Regulation of ICOs'

²²² FCA, 'The Propectus Regulation Rules sourcesbook', 2023

²²³ For example, in China, before 2018, only mainland residents and residents of Hong Kong, Macao and Taiwan can open A-share accounts. A-share is the RMB common stock. Foreign residents still cannot buy A-shares. A-shares are purchased in RMB. If foreigners want to buy Chinese stocks, they can purchase Chinese stocks indirectly after approval by the QFII government.

Table 1 The differences between IPO and ICO

IPO vs ICO		
	IPO	ICO
Investor's right	Ownership, dividend right and voting right	Can represent a variety of rights and obligations (depending on the types of the token)
Documentation requirement	Strict disclosure and registration requirements	White paper without uniform standards
Maturity	company should reached a certain level of maturity(issuer have to demonstrate a proper and stable amount of revenues)	Lower maturity
Marketing	underwriter conducts a book-building process	mainly through social media to publish vital information like launch announcements and communicate
Duration	Usually three to six months, sometime even one or two years.	usually one month
Cost	average costs directly related to an IPO are \$ 3.7 million.	between \$100,000 to \$500,000
Third party involvement	public investors do not have direct access to shares at the IPO price	Any individuals or institutional investors have direct access to the ICO from almost anywhere in the world

(Source: Researcher's development)

Table 1 shows the differences between IPO and ICO, some of the differences has been mentioned above like the right. The cost for IPO is much higher than ICO, since the average of IPO cost is about 3.7 million dollars.²²⁴ While ICO in the UK on average only costs between £ 40 to £ 2,900.²²⁵ That make the ICO are more suitable for the green startups. The marketing process is also different. The IPO has more strict requirements and the underwriter conducts a book-building process. The ICO's marketing main through the social media and networking by issue the core information and documentations.

²²⁴ PWC, 'Considering an IPO? First, understand the costs,' 2022 <<https://www.pwc.com/us/en/services/consulting/deals/library/cost-of-an-ipo.html>> accessed June 20th 2023

²²⁵ ICO., 'Data protection fee payment and online registration' < <https://ico.org.uk/for-organisations/data-protection-fee/faqs-data-protection-fee-payment-and-online-registration/>> accessed June 20th 2023

6. Summary

Since the 2008 financial crisis, FinTech has continuously integrated with the financial industry, relying on its innovative technological advancements. This confluence has presented both risks and abundant opportunities for the financial market. Key technologies within FinTech, such as artificial intelligence, blockchain, cloud computing, and big data, have consistently propelled the global financial industry's development over the past decade.

This chapter of the text primarily discusses the classification of FinTech from various perspectives and delves into the advantages and disadvantages of Initial Coin Offerings (ICOs) within FinTech. ICOs are distinct from traditional financing methods due to their low costs and capacity to attract private funding channels. Furthermore, the characteristics of ICOs as a financing tool may be highly compatible with the financing requirements of Green Finance. These specific discussions will be further elaborated in the following sections.

Chapter 3 Green Finance and ICO risks

1. Apply ICO in the Green Finance

1.1 The advantages for ICO applying in Green Finance

Based on the above discussion, financial service providers promoting ICOs as alternative financial instruments for green projects, or the developers of those green projects considering ICOs as an alternative finance mechanism. The existing traditional financing methods may not meet the growing financing needs of Green Finance. As it has been introduced in the Chapter two, the ICO is a promising system of raising funds for green startups, which has the need for fund raising but lack of channel. If the ICO can gain investors' trust and confidence by properly educating the public and strengthening the regulatory supervision, it has the potential to replace other expensive methods of raising funds for green startups. ICO can become a choice of Green Finance due to its relative transparency, low cost, and decentralization features. These advantages of ICO are due to the fact that the financing mechanism adopted by ICO itself is decentralized and reduces a large number of intermediate links. Although the current lack of regulation has made the development of ICOs more rapid, in the future, even if the regulators impose proper supervision, it will not affect the advantages of the current ICO, because it is mainly determined by itself rather than the regulatory environment.

The advantages of ICO as an emerging financing method can help Green Finance solve the current difficulties and overcome the problems that traditional way of funding cannot. For the traditional way of funding, as mentioned above, it is hard to find funding source. For ICOs, to find ways of funding could be easier. The first advantage of using ICO as a financing channel for Green Finance is that it can facilitate the flow of private capital into green projects by expanding the scope of investors. The ICO can unlock the capital of individual investors globally. It also can disrupt the traditional hierarchies in venture capital because traditional venture capital funds mainly allow a smaller group of elite investors to invest in highly innovative projects

which are generally unknown to the investing public.²²⁶ In contrast, ICO is a much more inclusive option for all investors, as long as investors understand how to invest with ICO. ICOs are directly marketed to the worldwide potential pool of investors, and they can bypass both banking and non-banking entities.²²⁷ This will help more potential investors to join the investment without the need for strict capital review or access requirements. When applied to Green Finance, the expansion of the scope of potential investors will enable Green Finance to no longer rely solely on traditional financing methods so as to obtain more funds from the private sector.

There are also some environmental factors that make ICO become a better choice, compare to the traditional way of funding. The banking regulation in the aftermath of the financial crisis of 2008-2009 affected the availability of resource for small and medium enterprises (SMEs), and it makes fundraising for new green initiatives more difficult.²²⁸ Also, Basel III has further increased capital requirements and risk weighted assets, causing increased pressure on banks and their Return on Equity (RoE).²²⁹ This led to more prudent business practices but also significantly restricted the financing instruments available for SMEs and businesses below investment grade.²³⁰ Furthermore, the emergence of shadow banking (traditional banking services are provided by private investment funds, insurance companies, crowd funding, and peer-to-peer lending) only marginally supports the creation of new ventures and highly innovative start-ups.²³¹ In this investment environment, it is difficult for green start-ups to obtain financing through traditional methods, and the advantages of ICO financing are also reflected.

The second advantage is that ICO can significantly reduce financing and transaction costs. The reason may be that there are fewer intermediaries involved and the lower cost of issuance itself.

²²⁶ Kaal and Dell'Erba, 'Initial coin offerings: emerging practices, risk factors, and red flags' (2017).

²²⁷ Ibid.

²²⁸ Ibid

²²⁹ European Banking Authority, 'Overview of the Potential Implications of Regulatory Measures for Banks' Business Models' (2015) <<https://www.eba.europa.eu/sites/default/documents/files/documents/10180/974844/fd839715-ce6d-4f48-aa8d-0396ffc146b9/Report%20-%20Overview%20of%20the%20potential%20implications%20of%20regulatory%20measures%20for%20business%20models.pdf?retry=1>> accessed on January 6th

2022

²³⁰ Ibid (n 50)

²³¹ Nicola Gennaioli, Andrei Shleifer and Robert W Vishny, 'A model of shadow banking' (2013) 68 *The Journal of Finance* 1331

The cost reduction of ICO can be considered from two perspectives, the investor's perspective, and the issuer's perspective. For the issuers, the process to create a new token is simple and cheap if they use the ERC20 standard.²³² The issuers can download the code for the token from Ethereum's website and adjust the code to set parameters like the total amount of tokens that are needed. Also, like has been introduced before, the launching process of ICOs is very simple and cheap compared to IPOs. The issuers only create the address to which investors' funds will be sent, and after investors send their funds to the address, they will receive tokens in accordance with a predefined exchange ratio. However, the cost of IPO varies depending on several factors like the size of the offering and the complexity of the IPO structure.²³³ The costs of IPO could include the legal fee, costs for hiring an external auditor, costs for hiring a financial reporting advisor, registration-related fees and expenses, exchange listing fees, and underwriter's discount.²³⁴ According to the PricewaterhouseCoopers, the average cost for an IPO is \$3.7m, excluding underwriter fees. Underwriters typically receive 5 to 7 percent of total proceeds in underwriter's discounts, which can be large depending on the size of the IPO. As an example, if an IPO raises \$100m in the capital, an underwriter collects \$5 to \$7m from this offering. In contrast, because there is no legal protocol to follow and no intermediary involvement is required in the case of an ICO, costs associated with an ICO are primarily related to creating and enhancing an online presence and initiating numerous communication networks. The cost of these procedures usually ranges from \$100,000 to \$500,000. Compared to the IPO, the ICO is still a cheap option to raise funds. In the Green Finance case, this relatively low-cost financing method is attractive and competitive for Green Finance, especially startups who lack financial support and have no access. Lower financing and transaction costs can help green startups save more money early on in green projects, thereby helping the projects to land earlier.

For the investors, although the cost reduction is not obvious when investors want to make the cross-border investment, the cost may be smaller. For example, in order to invest in a foreign company through an IPO, a potential investor will need to use the services of a broker. While in ICOs, the potential investors need only to have access to the Internet and find the projects they

²³² The ERC20 refers to a scripting standard used within Ethereum blockchain. This standard dictated a number of rules and actions that an Ethereum token or smart contract must follow and steps to be able implement.

²³³ Joo, Nishikawa and Dandapani, 'ICOs, the next generation of IPOs'

²³⁴ Ibid.

want to make the investment. Hence, for investors investing in ICOs is often easier and less costly compared to IPOs.

The third advantage of ICO is its financing ability in a short period of time which is desperately needed by many green start-ups. Once the projects are recognized by the public the speed of financing is fast. BAT raised \$35 million in 30 seconds.²³⁵ Also, some ICO projects have also received very large amounts of investment. For example, Bancor and EOS have raised more than \$150 million which is almost impossible for many startups if they choose traditional way of financing.²³⁶ For some green start-ups, when the company have no products, users, data but only one concept, has to use angel investment to raise funds. Other financing method like traditional VCs are difficult to obtain funding, since the VCs prefer projects with a higher probability of success. However, the failure rate of early-stage startups is very high, and the way of angel investment is more and more difficult for teams without resources and background to raise money.²³⁷ Previously, equity crowdfunding could be a good choice, but it essentially decentralizes early angel investment. It does not solve the problem of the follow-up return cycle, because the early-stage project risk is extremely high. However, due to the different financing principles, ICO can solve the problem of traditional financing very well. During crowdfunding of ICO projects, more than 50% of the tokens are generally sold to investors at one time.²³⁸ The essence of these encrypted tokens are not stocks but the right to use the product. If the project is really successful in the end, these usage rights will have extremely high benefits, which is different from traditional equity financing. While both tokens from ICOs and traditional equity can appreciate in value with the success of their associated projects or companies, the underlying reasons for this appreciation can differ. Equity represents ownership and a claim on profits, while tokens represent utility, usage rights, or a stake in a particular ecosystem. The success of

²³⁵ Basic Attention Token improves the efficiency of digital advertising by creating a new unit of exchange between publishers, advertisers and users. It all happens on the Ethereum blockchain. The value of the token is based on user attention, which simply means a person's focused mental engagement.

The ICO start on 31st May 2017 and ended on the same day, and the value of tokens sold in ICO is \$15 million.

²³⁶ Bancor is the first decentralized trading protocol, empowering traders, liquidity providers & developers to participate in an open financial marketplace with no barriers to entry.

EOS is a highly performant open source blockchain platform, built to support and operate safe, compliant, and predictable digital infrastructures. It had a record for raising \$4.2 billion for its EOS token, making it the biggest ICO in history.

²³⁷ PIG, 'Significance and advantages of ICO over traditional financing method IPO,' Bible Book (2020). <https://bible-book.com/?p=2693> access on March 3rd 2022.

²³⁸ It's worth noting that while many ICOs might sell a majority of their tokens during the fundraising phase, there's significant variability in token distribution strategies across projects. Some might reserve a portion of tokens for future development, partnerships, community incentives, or the project's team and advisors.

a project can drive demand for its associated token (thereby raising its value) because users need it to access or participate in the project's offerings. On the other hand, a successful company's stock might rise in value because of increased profitability, growth prospects, and investor confidence.

In traditional equity investment, the angel stage will sell about 10-20%. Second, there are many ICO participants who believe in the project and are willing to become early adopters, which can promote the development of the project. In addition, green projects usually have a long cycle and take a long time. For example, green building projects took an average of 8% longer than traditional building projects of similar size and characteristics.²³⁹ As well, on average, these projects were delayed by 4.8% compared with their original schedules. This makes the green projects continuously inject funds, and the lower transaction cost also makes ICO very competitive.

The fourth advantage of ICO in Green Finance is that it is very suitable for green startups, since ICO markets do not have strict standard or unified requirements for projects. The ICOs lower the commitment requirements for innovators as they delegate the development of the innovation to a decentralized network, as well as potentially providing the initial innovators with rapid exit options through the liquidity offered by token listing on exchange platforms.²⁴⁰ Also, ICOs facilitate broad access to funding green projects, start-ups, and tech companies since they raise capital from the market and offer investors a variety of investment options. The green projects do not need to accomplish restrictive standards (funding will not be available if strict project classification is met) like as with traditional investment and can use ICOs as a source of rapid liquidity.²⁴¹ In addition, some of the green startups don't have strong agenda like traditional investors. More open green projects and ideas that would not get funded under the traditional venture capital regime, such as green open-source projects, which are difficult to commercialize.²⁴² Some of the startups may be from countries that do not have access to institutional money or are not on the radar of venture capitalists due to a relatively small size

²³⁹ Bon-Gang Hwang and others, 'Sustainable green construction management: Schedule performance and improvement' (2013) 19 S43

²⁴⁰ PP Momtaz, 'Initial Coin Offerings' (2020) 15 PLoS ONE e0233018.

²⁴¹ Ibid (n 47)

²⁴² Magnus Schücker and Tobias Gutmann, 'Why do startups pursue initial coin offerings (ICOs)? The role of economic drivers and social identity on funding choice' (2021) 57 Small Business Economics 1027

market or lack of financial infrastructure like Eastern Europe.²⁴³ Therefore, ICO is suitable for green startups and can provide them with a source of funding, even if the project is not valued by traditional financing channels.

As discussed above, Green Finance itself still has many development obstacles that cannot be solved by traditional financing methods. The financing advantage of ICO comes from its own financing mechanism, and it is not simply because of the lack of supervision that it is more competitive. The emerging financing method of ICO can reduce costs, increase the inflow of private capital, and explore a wider range of potential investors. It can become a better choice for Green Finance. However, when ICO is applied to Green Finance, it will not solve the problem of the opacity of Green Finance information, which will be discussed on the next section.

2. Risks in Green ICOs

2.1 Risks inherent to ICOs

When applying the ICO in Green Finance, supervision may need to be considered from two aspects, namely from the perspective of ICO and the perspective of Green Finance. This is because when applying ICO in the Green Finance, the ICO might bring its risk to the Green Finance, and their risks are inherited and even amplified, such as information asymmetry and green washing issues.²⁴⁴ As for the current supervision of the Green ICOs, the regulator put more attention on the ICOs and ignored the supervision of specific areas (Green Finance). Take Green Finance as an example. Although the UK provides a detailed classification of tokens and company registration requirements for ICOs, there are no relevant regulations for the Green ICOs.²⁴⁵ In addition, it is unknown whether the laws and regulations related to Green Finance can be directly applied to the Green ICOs. Even if the mandatory application is unclear, voluntary adherence to the EU Green Taxonomy would still be possible and might be beneficial for financing. This challenges the application of regulation and law. Therefore, the current

²⁴³ Ibid

²⁴⁴ About these two issues will be discussed in the section 6.0 The problem when applying ICOs in the Green Finance

²⁴⁵ About the token classification and related regulation see at section 5.0 The current ICO regulation in the UK.

discussion on the supervision of Green ICOs will start from the existing discussion on the supervision of ICO and then further discussion on the application of Green Finance.

Appropriate supervision of ICOs will help protect investors and maintain the stability of both ICOs and the traditional market. The lack of adequate investor protection mechanisms can undermine the appeal of ICOs as an alternative financial instrument for green projects. While sound protection can enhance the confidence of investors, and also attract more investors in the green projects. However, the ICO market has always been volatile because of much speculation for dynamic pricing ICOs. For example, Bitcoin prices plunged \$10,000 in less than an hour on May 19th, 2021, from \$40,000 in one of the most severe drops since the world's most actively traded digital coin began its meteoric ascent to record peaks.²⁴⁶ Then, it rebounded almost as spectacularly as it fell later in the day and continued its rebound and reached above \$42,300. In such a hefty price volatility market, all transactions on digital currencies are the behavior of investors at their own risk. In addition, in the stock market, there is a two-way causal relationship between investor protection and stock market development.²⁴⁷ When better investor protection is expected, companies can issue more equity, leading to a broader stock market; in turn, more equity issuance expands the shareholder base and increase the political support for shareholder protection.²⁴⁸ This feedback loop can generate multiple equilibria, with investor protection, stock market size, and investor participation being positively correlated across equilibria.

Second, from the perspective of the financial regulation theory, when applied, ICO in Green Finance also has the risk of causing market failure. It means the inability of a market economy to reach certain desirable outcomes in resource use.²⁴⁹ Imagine a startup that wants to create a blockchain-based platform to track the carbon footprint of products throughout their lifecycle, from raw material extraction to end-of-life disposal. The goal is to offer consumers verifiable information about the environmental impact of their purchases. To fund this project, the startup launches an ICO, issuing tokens that can be used to access and interact with their platform once it's developed. However, due to the lack of regulatory oversight in many jurisdictions, the startup

²⁴⁶ Eva Szalay, 'Bitcoin flash crash amplified by leverage and systemic issues,' Financial Times <https://www.ft.com/content/b26319f6-6cb7-4e0e-a0d9-bac71d9b8c34> accessed 27th May 2021

²⁴⁷ Marco Pagano and Paolo Volpin, 'Shareholder protection, stock market development, and politics' (2006) 4 Journal of the European Economic Association 315

²⁴⁸ Ibid.

²⁴⁹ Mrinal Datta-Chaudhuri, 'Market failure and government failure' (1990) 4 Journal of Economic Perspectives

exaggerates claims about the potential impact of their platform, the progress they've made, and partnerships with major industries. Potential investors, motivated by both potential returns and a desire to support environmentally beneficial projects, might not have the means to verify the startup's claims. This asymmetry of information between the ICO issuers and the investors can lead to inefficient allocation of resources: funds could flow to projects that aren't genuinely sustainable or viable but present themselves as such.

If the market fails, the individual incentive for rational behavior do not lead to rational outcomes for the group. According to the market failure theory, the leading causes of markets failures include asymmetric information, negative externalities, public goods, imperfect competition, and biases in individual decision-making.²⁵⁰ Among buyers and sellers, there is what economists call an 'asymmetry of information,' with buyers, in general, being less well informed about a particular financial product.²⁵¹ For purchasers, to educate themselves sufficiently to be well known about the financial products they are being offered as the sellers. In the green ICO, the situation is particularly obvious. Because both ICO and Green Finance themselves face the problem of opaque information to a certain degree, this has led to a certain degree of information asymmetry between investors and ICO issuers.²⁵² The information asymmetric of Green ICOs can lead to green washing problems and make investors lose confidence in Green ICOs. Like the effects on financial markets, in the Green ICOs market, the investors will suffer unfair treatment and also cause financial markets to shrivel or implode.²⁵³ This increases the risk of market failure.

Due to the asymmetry of information in the green ICO market, an imperfectly competitive market will be formed. In fact, asymmetric information is pervasive in financial markets. The incumbents can exploit their market power without investors even noticing it.²⁵⁴ The result is that in many areas of financial services, competition is far from perfect, and distortions associated with imperfectly competitive markets, compounded by information asymmetries, are prevalent: excessively high prices, poor quality service, and the sale of defective or inappropriate products. A competitive market is based on the existence of a large number of

²⁵⁰ John Armour and others, *Principles of financial regulation* (Oxford University Press 2016)

²⁵¹ Ibid

²⁵² About the information asymmetric problem of ICO and Green Finance will be discussed in more details in the Section 6.1.

²⁵³ Armour and others, *Principles of financial regulation*.

²⁵⁴ Ibid

small producers, the free entry and exit of firms into and out of the market, and a large number of well-informed consumers who can switch between producers and suppliers cost-free. In the absence of these conditions, producers will be able to charge prices exceeding the cost of providing goods and services, and resources will not be allocated appropriately. The "appropriateness" typically refers to the efficient allocation of resources in a way that maximizes overall societal welfare. When resources are allocated appropriately, it means that they are being used in a manner that generates the highest possible value or benefit for society, given the available information and market conditions.²⁵⁵

The investors of the Green ICOs are hard to understand the progress of the green project fully, and the understanding of the working mechanism of ICO may not be able to reach the level of general investors' understanding of financial products in the financial market. Therefore, the green ICO market can quickly form a state of imperfect competition.

In such a market with asymmetric information and imperfect competition, investors can only avoid the adverse effects of the market on them if they remain rational. However, investors who cannot process information rationally may not respond this way. They may have biased, prejudiced beliefs about financial products and services, or they may be influenced by crowds and herds, or they may derive their beliefs from simple but inaccurate rules of thumb.²⁵⁶ In the ICO market, Because ICO is a relatively immature market, its high returns have led to a large number of speculators.²⁵⁷ In addition, the influence of celebrity effects on ICOs and cryptocurrencies cannot be ignored. This has led many investors to follow blindly and make their own investment decisions irrationally. For example, Li Xiaolai, known as China's "Bitcoin Richest Man", completed the ICO called the EOS blockchain project in five days and successfully raised US\$185 million. The PressOne project he hosted in 2017 did not even have a white paper, but it only took 4 hours to attract 14,000 people and raise nearly 500 million yuan.²⁵⁸ Blind obedience and herding effect led to the mess in China's ICO market in 2017, and the Chinese government finally chose to ban ICOs. The irrational beliefs do not just create

²⁵⁵ Ibid.

²⁵⁶ Thomas Gilovich, Dale Griffin and Daniel Kahneman, *Heuristics and biases: The psychology of intuitive judgment* (Cambridge university press 2002)

²⁵⁷ Giancarlo Giudici and Saman Adhami, 'The impact of governance signals on ICO fundraising success' (2019) 46 *Journal of Industrial and Business Economics* 283

²⁵⁸ Sina Technology, 'Personal experience: ICO does not look at the project to see the celebrity effect, and some are rubbish', (2017) Sina Finance <http://tech.sina.com.cn/i/2017-09-04/doc-ifykpya3210685.shtml> accessed on November 11st 2021

disappointed investors, but they also lead to misallocation of resources.²⁵⁹ In the ICO, this is reflected in the fact that a large number of funds may go to projects that are false or meaningless and purely hyped. Therefore, the massive speculation and celebrity effect currently existing in the ICO market can easily lead to market failure.

It is not advisable to pursue an unregulated ICO market only in accordance with the concept of Cryptonanarchism.²⁶⁰ Appropriate supervision should be imposed on ICOs, which are inherently decentralized and relatively unstable markets. When applying ICOs in Green Finance, it is possible to cause market failure since the current ICO and its market are not transparent enough and form an imperfect competition. Besides, the investors' speculation and herd behavior make it easier for the market to lose control. Merely relying on market self-regulation (invisible hands) cannot solve the existing problems of ICO, an emerging market. Otherwise, once the ICO market is unstable, regulators will have to force ICOs to be banned like the Chinese government. This will be discussed in the Chapter 6. Therefore, supervision of the ICO market is necessary. As the scale of the ICO market becomes larger and larger, it should be supervised in advance to prevent market failure and enable it to play its role as a financing tool.

2.2 Greenwashing (risks inherent to Green Finance)

One of the many challenges facing Green Finance is the issue of green washing. For the Green Finance projects, one of the issues that worries and concerned the customers is the Greenwashing. Greenwashing refers to the misleading action where green public relations or green marketing are used deceptively to promote the perception that a firm's products, aims, and policies are environmentally friendly.²⁶¹ Alternatively, more simply, greenwashing means that the company uses an environmentally friendly appearance to cover its environmentally unfriendly substance. Greenwashing can happen either at the company level or at the level of

²⁵⁹ Armour and others, *Principles of financial regulation*.

²⁶⁰ Cryptonanarchism (sometimes spelled as Crypto-anarchism) is a political and social philosophy that advocates for the use of strong cryptography and decentralized technologies to promote individual privacy, personal freedom, and resistance to government surveillance and control. The term is derived from cryptography, the practice of encoding information to ensure its confidentiality, and anarchism, a political ideology that seeks to minimize or eliminate hierarchical authority and promote self-governance.

²⁶¹ Xingqiang Du, 'How the market values greenwashing? Evidence from China' (2015) 128 *Journal of Business Ethics* 547

its products or services. Each of these levels includes the claimed green washing and the executional green washing.²⁶² They may exist independently or together.

The green claims mean companies use textual arguments that explicitly or implicitly refer to the ecological benefits of a product or service to create a misleading environmental claim.²⁶³ The claims can be classified as product orientation, process orientation, image orientation, environmental fact, or combine together.²⁶⁴ This classification method is divided according to the content that guides users.²⁶⁵ Alternatively, there is another classification about claim deceptiveness that is vague (ambiguous), Omission, False (Outright lie), acceptable, or combine these together.²⁶⁶ These two classifications of green claims are the division of the green statement from different angles.

(1) Greenwashing from company level

One famous example of Greenwashing from the company level is General Electric's "Ecomagination" campaign, aiming to make the company a more responsible corporate citizen.²⁶⁷ The project includes: develop sustainable technologies, increase its revenues from sustainable products, and lowering emissions, and improving energy efficiency at its production plants.²⁶⁸ Ecomagination, in GE's understanding, would enable this company to develop innovative technologies which help customers to meet their environmental and financial needs and aid GE in growing.

²⁶² Sebastião Vieira de Freitas Netto and others, 'Concepts and forms of greenwashing: a systematic review' (2020) 32 *Environmental Sciences Europe* 1

²⁶³ Ibid.

²⁶⁴ Les Carlson, Stephen J Grove and Norman Kangun, 'A content analysis of environmental advertising claims: A matrix method approach' (1993) 22 *Journal of advertising* 27

²⁶⁵ Product orientation means the claim focus on the ecological attribute of a product; process orientation claims means that ecological high performance of a production process technique; image orientation means the claim focus on enhancing the eco-friendly image of an organization, like the company or product associates an organization with an environmental cause or activity which there is elevated public support; environmental fact-claims that involves an independent statement that is ostensibly factual in nature from an organization about the environment at large, or its condition.

²⁶⁶ Ibid. Vague/ ambiguous claims means that green claims are overly vague, ambiguous, too broad, or lack of clear definition; omission green claim means it missing the necessary information to evaluate its validity; false/outright lie means the claims that are inaccurate or a fabrication; acceptable claims are green claims that they or their products do not contain a deceptive feature.

²⁶⁷ SS George and S Regani, 'Ecomagination'at Work: GE's Sustainability Initiative', *Managing Sustainable Business* (Springer 2019)

²⁶⁸ Ibid.

The GE company tried to advise the public that their companies are working in the environment area, but they simultaneously lobbied to fight against the new clean air EPA requirement.²⁶⁹ In fact, in all its years of existence of GE, had not been known as an environment-friendly company and it had for long been one of the biggest corporate polluters in the US.²⁷⁰ One of the biggest environmental controversies involving GE was related to the pollution of the Hudson and Housatonic rivers in the US. In the early 1980s, GE was accused of dumping millions of pounds of polychlorinated biphenyls (PCBs) into the two rivers near its factories. Even though EPA has banned the production, the GE still dumping the chemicals in the rivers after the EPA and contended that it was not responsible for the sediments already in the rivers. In this case, GE's Ecomagination is a kind of claim that their company is aiming to be environmentally friendly and can be considered as a combination of production orientation, process orientation, and environmental fact. However, their executional behavior showed that they behave opposite.

The companies involved in the greenwashing usually select to disclose positive information about a company's environmental or social performance while withholding negative information on these dimensions.²⁷¹ This kind of green washing from the company level may become more serious when combined with ICO since the degree of information disclosure of ICO companies is much lower than that of ordinary companies.

(2) Greenwashing from product level

An example of the product level is the L.G. refrigerators and its certified Energy Star label. The Energy Star is a government-backed third-party eco-label indicating that a product meets a set of energy efficiency guidelines, and it certified many of L.G. Electronics' refrigerator models.²⁷² However, ten of the certified L.G. refrigerator models had listed erroneous energy usage measurements on the labels and did not actually meet the standard required for the certification.²⁷³ This kind of greenwashing behavior is also more difficult to distinguish for the

²⁶⁹ The EPA is the United States Environmental Protection Agency. The Clean Air Act sets limits on certain air pollutants, including setting limits on how much can be in the air anywhere in the US.

²⁷⁰ Ibid.

²⁷¹ Thomas P Lyon and John W Maxwell, 'Greenwash: Corporate environmental disclosure under threat of audit' (2011) 20 *Journal of Economics & Management Strategy* 3

²⁷² Magali A Delmas and Vanessa Cuerel Burbano, 'The drivers of greenwashing' (2011) 54 *California management review* 64

²⁷³ Ibid.

consumer who lacks professional knowledge of green products. The average consumer rarely spends more energy to verify whether the product is environmentally friendly as the business claims. In this case, the LG product level green washing can be considered as false or outright lie claim deceptiveness since they deceived consumers by failing to conduct the correct qualification checks on their products.

More and more companies are promoting green environmental protection, but the number of greenwashing cases is also increasing.²⁷⁴ The increasing number of greenwashing cases will bring great negative effects to the entire green industry and other green companies. In a survey made by TerraChoice in 2008/2009, over 95% percent of products committed at least one of the TerraChoice “Seven Sins of Greenwashing.”²⁷⁵ The increasing trend of greenwashing could have profound negative effects on consumer confidence in green products, eroding the consumer market for green products and services.²⁷⁶ As for the green companies, the act of greenwashing will not only cause them to lose market credibility and consumers but also face litigation risks involving false advertisements.²⁷⁷ For example, Honda settled a class-action suit for false and misleading statements regarding the fuel efficiency of a hybrid vehicle.²⁷⁸ These negative effects may be the loss of a large number of customers so that the company will eventually lose the market.

3. Summary

In summary, this chapter has introduced the concept of Green Finance and its development in China and UK. Also, it discusses the reasons that why Green Finance need the support from ICO to acquire more funds. Then, it analyzed when apply the ICO in the Green Finance, the risks that might occur. These risks will come from both ICO risks and Green Finance risks. Thus,

²⁷⁴ Ibid

²⁷⁵ The ‘Seven Sins of Greenwashing’ are sin of the hidden trade-off, sin of no proof, sin of vagueness, sin of worshipping false labels, sin of irrelevance, since of lesser of two evils, sin of fibbing.

²⁷⁶ Nancy E Furlow, ‘Greenwashing in the new millennium’ (2010) 10 *The Journal of Applied Business and Economics* 22

²⁷⁷ Ibid

²⁷⁸ William S Laufer, ‘Social accountability and corporate greenwashing’ (2003) 43 *Journal of business ethics* 253

how to deal with these risks and set up an effective regulation framework become the primary issue and it will be discussed in the Chapter five.

Chapter 4 Law, Regulation, and ICO

1. Law and regulation

As its meaning and the scope of its inquiry are unsettled and contested, regulation is notoriously difficult to define clearly and precisely. Generally speaking, "Regulation" means sustained and focused control by a public agency over activities that are valued by a community.²⁷⁹ A key characteristic of regulation is that it involves a third party, which is the regulator, in market transactions and inter-organizational relationships and that it places responsibility for overseeing performance with a single entity, which is the regulator. In the view of mainstream economists, regulation serves primarily as a remedy for market failures.²⁸⁰²⁸¹ Regulators or regulatory agencies will be responsible for the formulation of regulatory rules and monitor whether participants in the market comply with the rules.

The law is a set of rules that govern behavior and are enforced by social or governmental institutions.²⁸² The definitions of law and regulation are similar but different. Law has two different roles in regulation: facilitative and expressive. The facilitative role means that the law is an instrument for shaping social behavior.²⁸³ A classic example is if a community would like to sustain the quality of its waterways. One of the possible ways is to promulgate a binding legal rule prohibiting any person from dumping waste exceeding a specified quantity into this public waterway and imposing a financial penalty on any person who violates this rule.²⁸⁴ Another possible way is to impose a system of tradeable permits that allows certain amounts of waste to be dumped into the public waterways upon payment of a specified sum. In this way, the law can be a 'threat' that proscribing conduct and threatens sanctions for the violation to deter that conduct; also, the law can be considered as an umpire that creates and polices the boundaries of

²⁷⁹ Aaron Wildavsky, 'Regulatory Policy and the Social Sciences. Roger G. Noll' (1987) 92 *The American journal of sociology* 1022

²⁸⁰ Stephen Breyer, *Regulation and its Reform* (Harvard University Press 1982)

²⁸¹ Anthony I Ogus, *Regulation: Legal form and economic theory* (Bloomsbury Publishing 2004)

²⁸² Geoffrey Robertson, *Crimes against humanity: The struggle for global justice* (Penguin UK 2006)

²⁸³ *Ibid.*

²⁸⁴ In this way, the law is playing the framing role, the law sets out rules and regulation that govern how individuals and organisations should conduct themselves in society. It can ensure that people can coexist peacefully and that everyone's rights and freedoms are protected.

space for free and secure interaction between participants. The second way shows the facilitative role of law.

The other role of law in regulation is expressive, which means the law institutionalizes values. Also, take the waterways as an example. A legislative prohibition on the disposal of waste into public waterways, accompanied by a sanction for violation, may be interpreted as an expression of the community's commitment to environmental preservation and public condemnation of polluting behavior. In this sense, the law can be viewed as institutionalizing and expressing values that democracy itself presupposes and that transcend political programs.

Law and regulation may seem to be functionally similar, but there is a difference between the two. The first difference is the source of legal legitimacy. The sources of legal legitimacy can be divided into two parts: substantive legality and formal legality.²⁸⁵ In terms of substantive legality, the basis for judging legal legitimacy lies in whether it conforms to the moral basis.²⁸⁶ As the minimum morality, the law should be based on morality (in a broad sense, including customs, basic human values, justice, and fairness), any law that violates the foundation of morality is illegitimate. However, due to the diversification of moral standards, it is unrealistic to judge legal legitimacy purely based on morality because it will only lead to disagreement and endless debate. In terms of formal legitimacy, the legitimacy of the law itself depends on the requirements of its superior law, except for the constitution, which is the mother of all laws) to gain legitimacy.²⁸⁷ However, if simply rely on the provisions of the upper law, it will lead to the evil law becoming the law. Therefore, in principle, the legality of the law is judged by formal legality, but when formal legality violates substantive legality, the law does not have legality. The legality of regulation is also similar. Not only must the content comply with the provisions of the higher-level law, but also the procedure must comply with the statutory promulgation procedures.

Both laws and regulations derive their legitimacy from various sources, but there are some distinct differences between the two. The first is the source of creation. Laws are typically created by legislative bodies, such as Congress in the U.S. or Parliament in the U.K. They derive

²⁸⁵ Jules Coleman and Scott Shapiro, 'The Oxford handbook of jurisprudence & philosophy of law' (2002)

²⁸⁶ Deryck Beyleveld and Roger Brownsword, 'The practical difference between natural-law theory and legal positivism' (1985) 5 *Oxford Journal of Legal Studies* 1

²⁸⁷ *Ibid.*

their legitimacy from the fact that these bodies are comprised of elected representatives of the people. When these representatives enact a law, it is considered a reflection of the will of the people. Regulations are detailed rules or directives made by executive agencies or departments. They are based on broader statutes enacted by legislative bodies. The legitimacy of regulations stems from the enabling laws that authorize agencies to issue these rules.

The second difference regarding laws and regulations is the difference in their issuing agencies and issuing procedures. The law is established through the billing process before it becomes law. In order to become law, a bill must be written, sponsored by a legislator, debated, and passed through a legislative body like the House of Commons (UK) or the National People's Congress (China). As opposed to the legislation, a regulation is developed by a governmental agency, often in order to implement a given law. An agency holds a public hearing before adopting, changing, or rejecting a regulation after that hearing.

Moreover, another difference between law and regulation is that law is a more general concept that encompasses a broader range of social relationships, while regulation is a more specific tool that is used to govern particular activities or sectors. Law creates the overall legal framework for society, while regulations are designed to implement and enforce specific aspects of that framework. Thus, law is constitutive to the whole society and play a constitutive role. The constitutive role of law refers to the idea that law not only regulates society but also shapes it by defining and creating social relationships, institutions, and norms.²⁸⁸ In other words, law plays a crucial role in constituting social reality, including the structures, processes, and practices that underpin social life.

In terms of the constitutive role of law, both law and regulation can play a role in shaping social reality by defining and creating social relationships, institutions, and norms. However, law has a broader and more fundamental role in this regard, as it creates the overall legal framework within which regulations are developed and enforced. Laws are created by governments or other authorities with the power to legislate, while regulations are typically created by government agencies or other bodies with delegated authority to create rules within a specific area. As for

288 Cotterrell, R. (2017). The constitutive role of law. In *The Routledge Handbook of the Sociology of Law* (pp. 44-57). Routledge.

their function, the primary function of law is to regulate behavior and provide a framework for social relationships, institutions, and norms. The constitutive role of law means that it not only regulates society but also shapes it by defining and creating social relationships, institutions, and norms. Regulations, on the other hand, are more specific and detailed rules that are used to implement and enforce specific aspects of the legal framework created by law. For the enforcement, Laws are enforced through a system of courts and other legal institutions, while regulations are enforced by government agencies or other bodies with delegated authority to monitor compliance and impose penalties for non-compliance.

1.1 Law, Regulation, and innovation

Law is often perceived as lagging behind innovation. This may be based on several reasons. The first reason that law falls behind technology is that the speed of technological development in recent years has been faster than before. Normally, technology can only come to market with contract and property law already controlling its use. Many technologies, such as blockchain and AI, have entered the market without being fully controlled by law. Even later, the regulatory authorities only promulgated some regulations rather than laws. Compared with technological innovation, the changes in the legal and regulatory system are much slower.²⁸⁹ For example, over the last 250 years, the number of scientific journals has doubled approximately every 15 years, and the number of "important findings" has doubled every 20 years.²⁹⁰ It is estimated that the scientific knowledge people created in the past 40 years are more than the previous 5,000 years.²⁹¹ The more obvious example is that there are over 1.6 million patent applications worldwide, and it grows at a rate of 4.7% per year.²⁹² The top three areas are medical technology (32.2%), audio-visual technology (28.3%), and information technology 27.7%.²⁹³ Another reason worth considering is that legislation is a slower process. The promulgation of the law needs to pass the review of the draft, review by the relevant legislative body, and finally,

²⁸⁹ As far back as 1986, the US office of Technology Assessment (OTA) noted that because a relatively slow and ponderous process, technology change is now outpacing the legal structure that governs the system, and it is creating pressures on Congress to adjust the law to accommodate these changes.

²⁹⁰ Tuomi, Ilkka, 'Moore, and Accelerating Change', Joint Research Center (2003), <http://www.meaningprocessing.com/personalPages/tuomi/articles/Kurzweil.pdf> accessed at December 18th 2020

²⁹¹ Joel Garreau, 'Science's mything links: As the boundaries of reality expand, our thinking seems to be going over the edge' (2001) The Washington Post C1

²⁹² World Health Organization, 'Quality & Safety in Genetic Testing: An Emerging Concern' (2018) World Health Organization

²⁹³ Ibid.

promulgated on a certain date. These procedures often take months or even years. Also, it may also be due to the consideration of the stability of laws and regulations. The introduction of laws and regulations often lags behind the development of technology. After the law is enacted, it must maintain stability to a certain extent and cannot be changed overnight. The imperfection and hysteresis of the law are the characteristics that always accompany the law. After all, the code is not suitable for frequent revision. Otherwise, it may affect people's reasonable expectations of legal rules. Hence, technological development has been accelerating, but the law or regulation cannot follow.

The second reason is that most of the law and regulatory frameworks are based on static rather than a dynamic view of society, industry, and technology, and in the early stage of technology development, legislators cannot have a deep and clear understanding of it. For example, in China, before the popularity of the Internet, the legal definition of property was more traditional and did not include virtual property.²⁹⁴ Legislators in China have adopted an open approach to legislation. Therefore, there is no unified definition of the connotation of virtual property.²⁹⁵ Such an open rule has caused great controversy when it comes to inheritance. There are two cases that represent this field: 1: QQ number inheritance dispute and online store inheritance.²⁹⁶ The issue in both cases is that the relevant laws did not anticipate the impact of new technology on traditional legal concepts.

1.2 Law and regulation follow the FinTech

Law and regulation distinctions are also made in the FinTech context. For example, in the civil law jurisdictions, the law on FinTech is a collection of legal provisions promulgated by the

²⁹⁴ In China, Article 29, 48 and 75 of the 'General Principle of the Civil Law' stipulate that property refers to the whole property rights of a natural person or organization, including not only physical but also limited property rights other than ownership.

²⁹⁵ In China, Civil Code' Article 127 stipulates that if the laws have provisions on the protection of data and network virtual property, such provisions shall be followed. It does not stipulate the concept, standard and connotation of network virtual property, so it cannot solve many legal problems faced by virtual property.

²⁹⁶ 1. In memory of Wang's husband's death in a car accident in Shenyang, Wang asked Tencent for her husband's password in order to access the emails and photos, but Tencent rejected her request. Tencent argued that: according to 'Tencent Service Agreement', the ownership of QQ number belongs to Tencent, and the QQ number of the deceased Mr. Xu can only be used by himself, and on one else including the heir Ms. Wang has the right to claim it. However, this claim may violate the provisions of standard clauses in Chinese Contract Law.

2. to address the succession dilemma caused by the sudden deaths of two Taobao store owners in 2012, Taobao introduce the rules for the death of an online store owner in April 2013.

corresponding legislative body²⁹⁷, which may include the definition of FinTech, the technologies it includes, and under what circumstances the behaviors are regarded as illegal. The regulation of FinTech refers to certain restrictions or regulations imposed by the government on the subject of FinTech activities through specific regulatory agencies such as the central bank.²⁹⁸ Its essence is government supervision behavior with specific connotations and characteristics. Currently, neither China nor UK has specific legislation on FinTech. However, the government's regulatory agencies have issued many relevant regulations and documents for supervision. Take ICO as an example, the "Announcement on Preventing Financing Risks of Token Issuance" jointly issued by the People's Bank of China and seven other ministries and commissions, and FCA issued "Consultation Paper: Guidance on Cryptoassets." Then the FCA published its final guidance on crypto assets in its policy statement later that year (in July 2019) and provided much-needed guidance to the market on its regulation of virtual assets.

The regulation of FinTech is essentially discussing the regulation of disruptive technologies. Regulation always follows technology, and not all new technologies will challenge existing laws and regulations. Unlike regular technology, disruptive technology could drive change in the regulation and it usually has three features: first, it involves a new or improved technology; second, it may have a significant impact on the economy and society; third, law or regulation-disruptive technology does not fit into the current legal framework and some of the technologies even designed in the way of regulatory arbitrage.²⁹⁹ For example, 3D printing threatens the barriers to patent infringement—production.³⁰⁰ The patent law can be infringed easily by 3D printing, and people can make products at home without a complicated machine. 3D printing may have more than \$600 billion value in the U.S. economy.³⁰¹ Also, it is estimated that there were more than \$100 billion in losses as a result of intellectual property theft due to the rise of

²⁹⁷ In China, the legislative body is National People's Congress. In the UK, the legislatures of the United Kingdom could be derived from different sources. The parliament of the UK is the supreme legislative body for the UK and other territories with Scotland, Wales and Northern Ireland each have their own devolved legislatures. (No devolved competence in financial regulation).

²⁹⁸ China adopts the separate supervision, thus which financial intermediaries are regulated depends on which field (banking, securities, insurance) the activities of FinTech involve. Two Peaks model is adopted by the UK, thus PRA might responsible for prudential issues that FinTech involved and FCA for FinTech conduct issues.

²⁹⁹ William Sowers, 'How do you solve a Problem Like Law-Disruptive Technology' (2019) 82 Law & Contemp Probs 193

³⁰⁰ Deven R Desai and Gerard N Magliocca, 'Patents, meet Napster: 3D printing and the digitization of things' (2013) 102 Geo LJ 1691

³⁰¹ Sean Monahan, '3-D Printing's Economic Benefits Are Too Big to Ignore', The Hill, (2017) <<https://thehill.com/opinion/technology/359672-3-d-printings-economic-benefits-are-too-big-to-ignore>> accessed at December 17th 2020

3D printing every year.³⁰² In this way, it is uncertain what protections patent law provides and what kind of 3D printed products can be considered patent infringement. This kind of early technology inevitably has an impact on the existing legal and regulatory system.

These two reasons result in regulation and law always follows the innovation. The main technologies included in FinTech, such as artificial intelligence, blockchain, and big data, are all disruptive technologies since they dramatically changed the way the financial market works.³⁰³ These technologies only experience about ten years of development, but the relevant legislation and regulations have not grown to the corresponding level. For example, before Bitcoin was banned, China only had three documents that were directly related to the ICO and Bitcoin area. There are "Notice on Preventing Bitcoin Risks," "Announcement on Preventing Token Issuance and Financing Risks," and "Notice on Further Preventing and Dealing with Risks of Virtual Currency Trading Hype." For the current rapidly developing ICO field, only three government notification documents are far from achieving the effect of regulation. Of course, this is also related to the government's regulatory attitude towards ICO. Therefore, the regulation of FinTech also follows the development of FinTech development. For example, p2p lending and Bitcoin in China. Due to the falling behind regulation on p2p lending, many credit risks appeared in the final lending market. Many lending companies ran away, and borrowers could not get their funds repaid. As for Bitcoin, large amounts of Bitcoins are used for money laundering and other criminal activities. But for a long time, there have been not enough regulatory rules for Bitcoin. Also, the the enforcement of the Bitcoin regulation is deficient. That's because lack of transparency and traceability in the Bitcoin network makes it challenging for authorities to identify and track down illegal transactions.³⁰⁴ Therefore, although the regulation of financial technology is inevitably lagging behind, it should actively catch up with the pace of FinTech.

As for regulatory agencies, FinTech regulatory agencies are usually departments or institutions with financial regulatory functions in the traditional sense of each country. For example, the

³⁰² Gartner, 'Gartner Says Uses of 3D Printing Will Ignite Major Debate on Ethics and Regulation', (2014) <https://www.gartner.com/en/newsroom/press-releases/2014-01-29-gartner-says-uses-of-3d-printing-will-ignite-major-debate-on-ethics-and-regulation> accessed December 17th 2020

³⁰³ For more details, please check chapter 2 FinTech.

³⁰⁴ U.S. Department of State, "China 2018 Human Rights Report," accessed February 18, 2023, <https://www.state.gov/reports/2018-country-reports-on-human-rights-practices/china/>

Central Bank of China, the China Banking Regulatory Commission, the FCA of the United Kingdom, and so on. As FinTech regulators, they are responsible for maintaining the stability of the FinTech market and preventing or reducing financial risks. However, the technical purposes of the financial technology market are decentralized. It is possible that self-regulation may be of greater help to its regulation because self-regulation might balance the problems between technological development and regulation, which will be discussed in the self-regulation section.

1.3 Self-regulation and technology driven market

The regulatory classification base on financial objectives is relatively common, but self-regulation should be a very important part of the financial technology field. The traditional way of regulation, like a purely top-down, centralized state regulation of complex financial systems, is considered to be fundamentally inadequate.³⁰⁵ That is because informational flows present insurmountable challenges to so-called command and control regulation in today's society.³⁰⁶ The top-down regulatory approach is criticized by legal scholars and social scientists because the government exercises a full monopoly on making and enforcing the rules. The government has insufficient knowledge to identify the reason for problems, design solutions that are suitable, and identify non-compliance (information failure).³⁰⁷ In addition, the failings of government regulation include the inability to design appropriately sophisticated and effective legal and policy instruments to address complex social problems (instrument failure), insufficient implementation of the rules (implementation failure), and insufficient motivation of regulated entities and individuals to comply with the rules (motivational failure).³⁰⁸ This criticism suggests that relying on the government as the sole source of regulation applicable to the complicated financial system will suffer from the important built-in handicaps of information asymmetry and expertise deficit. Because of these handicaps, financial regulation is likely to be

³⁰⁵ Saule T Omarova, 'Rethinking the future of self-regulation in the financial industry' (2010) 35 *Brook J Int'l L* 665

³⁰⁶ The term 'command and control regulation' means a strictly centralized system of government rulemaking and enforcement. See Darren Sinclair, *Self-Regulation Versus Command and Control? Beyond False Dichotomies*, 19 *LAW & POLY* 529, 531-32 (1997).

³⁰⁷ Julia Black, 'Understanding the Role of Regulation and Self Regulation in a " Post-regulatory' (2001) 54 *World 103*

³⁰⁸ *Ibid.*

reactive rather than proactive and thus incapable of addressing systemic financial risk ex-ante rather than attempting to remedy it after the fact.

The self-regulation approach is trying to understand how regulatory decisions are made in practice and how power and responsibility are allocated among different public and private actors interacting in real life. The self-regulation approach has two advantages. There is a potential advantage in the industry's superior ability to access and evaluate relevant market information in an efficient and timely manner.³⁰⁹ Informational advantage plays an increasingly important role in regulating the increasingly complex financial markets and activities. Other potential advantages of private industry actors over government regulators include their ability to monitor and regulate their own business operations globally, regardless of national borders and jurisdictions.

Take the U.S Security industry as an example, in accordance with the Securities Exchange Act of 1934,³¹⁰ a variety of SROs(Self-regulation Organizations), including the National Securities Exchanges and the Financial Industry Regulatory Authority ("FINRA"), is responsible for overseeing the activities of securities brokers, stock exchanges, listed companies, and other market intermediaries. In accordance with the statutory scheme, SROs are mainly responsible for establishing the standards under which their members conduct business and monitoring the actual conduct of their members. Securities SROs ensure compliance by their members with U.S. securities laws and regulations, as well as with their own rules. As one of the key gatekeepers in the securities markets, SROs are responsible for monitoring and investigating suspicious trading activities, and detecting and preventing securities fraud, among other things. The objective of self-regulation in the U.S. securities industry is "investor protection and market integrity through effective and efficient regulation."³¹¹ Self-regulation plays an important role in the U.S. securities industry and sets an example in other financial areas.

It is worth considering that although the self-regulation system has many advantages, the establishment of its advantages depends on the division of the business scope of self-regulation and the business scope of government regulation and the design of the regulation mechanism.

³⁰⁹ Ibid, (n 22)

³¹⁰ Securities Exchange Act of 1934, 48 Stat. 881(codified as amended at 15 U.S.C. § 78a–78mm (2000)).

³¹¹ Ibid (n 22)

If the government's regulation is too strong, self-regulation is likely to be captured and become mere formal self-regulation. And for different financial markets, services, and products. Also, some people argue that it is unrealistic to expect self-interested private parties to voluntarily limit their own profit-seeking activities for the sake of a highly fragmented and uncertain public good.³¹² Therefore, the scope of self-regulation also needs targeted adjustments: How much power should be transferred for self-regulation is the most worthy consideration when designing a self-regulation system;

Technological progress and advances in communication fundamentally change the content where regulation operates by creating a new demand for openness and encouraging self-regulation by private actors empowered to act collectively and to form norm-generating institutions.³¹³ The self-regulation approach can better deal with technology-driven financial markets.

2. Financial regulation and FinTech

2.1 The definition of financial regulation and its objectives

The 2008 subprime mortgage crisis severely hit the world economy. More than \$15 trillion loss was caused in developed countries around the world, which is almost one-fifth of the value of world annual production.³¹⁴ It also led to the collapse of some prestigious banks, such as Lehman Brothers, and a sudden increase in unemployment. After the crisis, people began to reflect on the root cause of this financial crisis and how to prevent similar situations from happening again in the future.³¹⁵ One of the reasons that caused the crisis was misconduct in financial regulation.³¹⁶ Therefore, many countries have begun to carry out regulatory reforms to meet the challenges that may occur in the future.

³¹² Omarova, 'Rethinking the future of self-regulation in the financial industry'

³¹³ Orly Lobel, *The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought* (2003)

³¹⁴ Al Yoon, 'Total Global Losses From Financial Crisis: \$15 Trillion' *The Wall Street Journal* (1 October 2012) <<https://blogs.wsj.com/economics/2012/10/01/total-global-losses-from-financial-crisis-15-trillion/>> accessed 10th September 2020

³¹⁵ It was only in 2010 that misconduct was identified as a primary cause, and the associated enforcement began. Until then, hidden leverage and related systemic risk were considered the main causes.

³¹⁶ Armour and others, *Principles of financial regulation*

Regulation is a control function with regulatory obligation being imposed by laws or secondary instruments, rules, guidance, or principles or by administrative discretion. Financial regulation refers to the body of controls established by authorities to limit the risks assumed by banks or other financial institutions or to the imposition of such provisions either generally or with regard to the activities of a particular bank or institution.³¹⁷ The theory of regulation is based on the idea that markets are not always perfect and that there may be market failures where the market fails to allocate resources efficiently. The main purpose of financial regulation is to improve the functioning of the financial system.³¹⁸ The financial system not only lets capital run smoothly but also links the economy of the past and future. For example, the date of delivery of futures can be one week later, one month later, three months later, or even one year later.

The financial regulation has six objectives: protect investors and users, protect consumer protection in retail finance, maintain financial stability, facilitate the efficiency of capital markets, promote competition, and prevent financial crime.³¹⁹ These six goals also provide a design framework for the construction of a green ICO regulatory system.

It is an important objective of the financial system to protect the interests of its investors. Investor protection is an explicit goal of securities regulation. As far as issuers of securities are concerned, investor protection is largely understood as requiring the disclosure of relevant information. Without this information, prospective investors will not be able to assess clearly the risks and rewards of the investment. This will result in them refusing to advance funds. Based on the economic rationales for regulation, an adverse selection problem arises due to asymmetric information. For example, in an adverse selection problem, investors are at a disadvantage because they cannot tell the difference between good quality and poor quality goods or services. As a result, they only willing to pay a low price for the product or service, even if it is of high quality. The sellers on the other hand, know the true quality of the product and may be unwilling to sell it at a low price, leading to a market failure. So, in the financial market scenario, the situation is the same. The information asymmetries between end users of

³¹⁷ G A Walker, *International Banking Regulation Law, Policy and Practice* (Kluwer Law London 2001), Introduction

³¹⁸ Armour and others, *Principles of financial regulation*

³¹⁹ Ibid

the financial system and financial intermediaries should be broadly regulated.³²⁰ Investors are vulnerable to losses due to information asymmetry. Therefore, the protection of consumers has become the goal of financial regulation.

The second objective is to protect the consumers in retail finance. The rationale for the regulation of consumer transactions is significantly broader than that of most other types of users of the financial system. It encompasses not only asymmetric information but also behavioral considerations. Regulators may have a role to play in protecting consumers from the exploitation of their biases and inaccurate judgments.

The third goal is to maintain financial stability. Maintaining financial stability became important after the 2008 financial crisis. That's because a failure of one institution can have a domino effect on the entire financial sector and repercussions for the economy as a whole.³²¹ But financial stability has not been a highly emphasized goal before. For example, during the financial crisis, the UK's financial regulatory regime did not mention financial stability as a goal at all: it was believed that protecting users of the financial system and maintaining market confidence would necessarily lead to financial stability.³²² However, the fact is sophisticated investors are just as capable of engaging in 'run'-like behavior as unsophisticated consumers.³²³ One of the most prominent takeaways from the financial crisis is the insufficiency of existing prudential regulation in maintaining financial stability. In response to this realization, various new regulatory measures have been implemented, including regulations specifically tailored to institutions deemed to be of "systemic importance," as well as the introduction of a new form of regulation referred to as "macroprudential" regulation, which is designed to address the stability of the financial system as a whole.

The next objective of financial regulation is to facilitate market efficiency. The "efficiency" here is not related to the efficiency of capital markets but informational efficiency. In terms of the operation of the financial system, information efficiency is very important because an

³²⁰ Ibid

³²¹ When the financial crisis comes, because people lack information about the market, there will be a large number of runs, which will accelerate the arrival of the financial crisis.

³²² See now Bank of England Act 1998 (UK) (as amended by the Banking Act 2009 and the Financial Services Act 2012), s 2A; Financial Services and Markets Act 2000 (UK) (as amended by the Financial Services Act 2012), s 2B(3).

³²³ Gary B Gorton, *Slapped by the invisible hand: The panic of 2007* (Oxford University Press 2010)

information-efficient market can effectively stimulate liquidity.³²⁴ For example, a market with known information inefficiency, in which some transacting parties will believe that their counterparties are buying and selling based on superior information and thus mask the price at which they transact. (This is known as "widening bid-ask spreads.") Other parties tend to hold off on trades until they believe all relevant information has been incorporated into the price. Both of these scenarios will reduce the number of parties willing to transact, impeding liquidity. Greater liquidity, in turn, helps mobilize investors to participate in the market. More investors entering the market is also conducive to the expansion and development of the market.

The fifth objective of financial regulation is to promote competition in the industry. Despite the fact that most jurisdictions have specialist competition laws and regulators, the task of promoting competition in the financial sector is also partially handled by financial regulators. In most jurisdictions, there are antitrust laws and regulators specifically focused on competition (antitrust). However, financial regulators are also partially responsible for promoting competition in the financial sector. The improvement of competition is mainly manifested at the international level and within certain jurisdictions. For example, in the EU, throughout the EU, the member states have been required to drop restrictions on international firms and to give credit to the regulatory regimes in place in other member states. A financial services firm licensed in any EU member state is considered to have a 'passport' to market its services throughout the EU without additional regulatory burdens being imposed by other EU members. For certain jurisdictions, by eliminating ties between brokers, dealers, and exchanges, greater competition between venues for trading securities is possible.

The competitiveness of the financial market is important because it promotes efficiency, innovation, and lower costs for consumers. When financial markets are competitive, firms are incentivized to provide better services and products at a lower cost, which benefits consumers by providing them with more choices, better quality products, and lower prices.

According to a report by the International Monetary Fund, competition in the financial sector can lead to greater efficiency and lower costs, which can boost economic growth and promote

³²⁴ Ibid

financial stability.³²⁵ The report also notes that a competitive financial sector can encourage innovation, as firms seek to differentiate themselves from their competitors by developing new products and services.

Furthermore, a competitive financial market can also reduce the concentration of market power in the hands of a few dominant players. This can help prevent anti-competitive behavior, such as collusion, price fixing, and barriers to entry, which can harm consumers and limit their choices. One study found that increased competition in the banking industry in the European Union led to lower lending rates, which benefited consumers and businesses.³²⁶ Another study found that increased competition in the mortgage market in the United States led to lower interest rates and better loan terms for consumers.³²⁷ Therefore, a competitive financial market can benefit both consumers and the economy as a whole by promoting efficiency, innovation, and better outcomes. Therefore, governments and regulatory bodies often strive to promote competition in the financial sector through various policies and regulations.

The last objective of financial regulation is preventing financial crime, and it is the primary goal in many countries. This goal is relatively straightforward and highly related to the criminal law of a country or region. Here, on the one hand, regulation is to prevent the expansion of irregular behavior of financial market participants and touch the criminal field, and on the other hand, it is also to ensure the healthy and stable operation of the market.

(1) The importance of financial objectives in ICO market

325 International Monetary Fund, "Competition in the Financial Sector," 2018, <https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/07/09/Competition-in-the-Financial-Sector-45935>.

326 Stijn Claessens and Luc Laeven, "What Drives Bank Competition? Some International Evidence," *Journal of Money, Credit and Banking* 36, no. 3 (2004): 563-584, <https://www.jstor.org/stable/3839012>.

327 Vasso Ioannidou, Steven Ongena, and José-Luis Peydró, "Monetary Policy, Risk-Taking, and Pricing: Evidence from a Quasi-Natural Experiment," *Review of Finance* 16, no. 1 (2012): 29-74, <https://academic.oup.com/rof/article/16/1/29/1573118>.

These six objectives are important because if the goals are not met, it may lead to market failure. The final result of a market failure is a suboptimal allocation of resources, which can result in a variety of negative outcomes for society. The exact consequences will depend on the nature of the market failure, but generally, it can result in reduced economic efficiency, inequality, and lower levels of social welfare.³²⁸ In such a market, investors may be less interested in investing, and sellers of products or services may take advantage of information gaps to shoddy. In the end, the market will lose a large number of investors and users. Market failures will continue to hinder the necessary flows of funds that are needed in Green Finance.

Take ICO market as an example. If the ICO market experiences market failure, it could have significant negative consequences for investors, issuers, and the overall cryptocurrency market.³²⁹ One potential market failure in the ICO market is the problem of information asymmetry. This occurs when issuers have more information about the quality of their project than investors do. As a result, investors may not have access to all the information they need to make informed investment decisions. This could lead to a situation where low-quality projects are overfunded, while high-quality projects do not receive the necessary funding to succeed.

Also, if the ICO market experiences market failure due to information asymmetry, it could lead to a loss of investor confidence and a decrease in overall investment in the cryptocurrency market. This could lead to a decline in the value of cryptocurrencies and harm the development of new projects that rely on ICO funding. A study by the Cambridge Centre for Alternative Finance found that ICO funding has decreased significantly since its peak in 2018. This could be due in part to investor concerns about the quality of ICO projects and the potential for market failure.³³⁰ Thus, the market failure in ICO should be taken into consideration.

Furthermore, market failure in the ICO market could also lead to increased regulation and scrutiny from policymakers. If ICOs are perceived as risky or fraudulent, policymakers may feel

³²⁸ OECD, Market failures and economic efficiency (Paris: OECD Publishing, 2016).

³²⁹ The U.S. Securities and Exchange Commission (SEC) has highlighted the potential for information asymmetry in the ICO market and has taken steps to regulate the market more heavily to protect investors. In a 2017 report, the SEC stated that "investors may be less able to evaluate the likelihood of success or the potential of the project, given the lack of disclosure about the project or the underlying technology."

³³⁰ Cambridge Centre for Alternative Finance. (2019). Global Cryptoasset Benchmarking Study. [online] Available at: <https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/global-cryptoasset-benchmarking-study/> [Accessed 20 Feb. 2023].

the need to intervene and regulate the market more heavily.³³¹ This could make it more difficult for issuers to raise funds through ICOs and could limit the growth of the cryptocurrency market.

In summary, if the ICO market experiences market failure, it could have significant negative consequences for investors, issuers, and the overall cryptocurrency market. It could lead to a loss of investor confidence, decreased investment in the market, and increased regulation from policymakers. This result is very unfavorable for the development of an industry such as Green Finance through ICO. Therefore, it is very important for the regulatory goals above the ICO market.

2.2 Different types of financial services regulation

As has been mentioned, the economic purpose of regulations is to address market failures.³³² In theory, a market failure occurs when a free market does not allocate goods and services in a Pareto-efficient manner³³³, often leading to economic losses. The leading causes of market failures include asymmetric information, negative externalities, public goods, imperfect competition, and biases in individual decision-making.³³⁴ Among buyers and sellers, there is what economists call an 'asymmetry of information,' with buyers, in general, being less well-informed about a particular financial product, for purchasers to educate themselves sufficiently to be well-known about the financial products they are being offered as the sellers. Various market failures exist in the financial services sector, and it is useful to classify the different strands of regulation according to the market failure they are intended to address.³³⁵ There are four types of financial regulation: prudential regulation, market structure regulation, conduct regulation, and public interest regulation.

331 In 2018, the Australian Securities and Investments Commission (ASIC) issued a warning about the risks of ICOs and the potential for fraud in the market. The ASIC stated that "ICOs are highly speculative investments, are mostly unregulated, and the chance of losing your investment is high."

Australian Securities and Investments Commission. (2018). ASIC puts investors on notice about ICO and crypto-asset schemes. [online] Available at: <https://asic.gov.au/about-asic/news-centre/find-a-media-release/2018-releases/18-197mr-asic-puts-investors-on-notice-about-ico-and-crypto-asset-schemes/> [Accessed 20 Feb. 2023].

³³² Philip Treleaven, 'Financial regulation of FinTech' (2015) 3 *Journal of Financial Perspectives*

³³³ Pareto optimality is a situation where no action or allocation is available that makes one individual better off without making another worse off.

³³⁴ Armour and others, *Principles of financial regulation*

³³⁵ The market failure for ICO will be discussed in the Section 4.

The prudential regulation contains micro-prudential regulation and macro-prudential regulation. A micro-prudential regulation addresses the issue of institutions with incentives to take excessive risks. In terms of micro-prudential regulation, regulators are concerned with ensuring that individual institutions are safe and well-run. One advantage of micro-prudential regulation in the FinTech area is that regardless of the number of customers a start-up has if the start-up offers products or services only available from regulated entities, customers can expect the same level of protection as if they were customers of one of the regulated businesses unless it has been explicitly agreed otherwise with the regulators and the customers.

A macroprudential regulation addresses the same issue with respect to markets as a whole; many of them tend to operate in destructive boom and bust cycles. Macroprudential regulators use a primarily analytical toolkit—they collect and analyze data, and if they have specific concerns, they request specific reports or stress tests. Also, regulators will examine the possibility of system risks. Similar examples can be drawn from the start-up world in Bitcoin mining: despite the fact that miners are not as concentrated as they are now, systematic regulators would investigate what might cause the system to fail, for example, reliance on mining pools, central servers for updating mining software, or coordinated attacks.

The second type of regulation is market integrity regulation. Regulation of market structure is concerned with ensuring that markets are as efficient as possible. Regulation of market structure aims to address situations in which some participants have a structural advantage. In many cases, it makes it illegal to trade securities when in possession of material nonpublic information, such as insider dealing. Other regulations may ensure that key market information cannot be accessed differently by different players - for example, some players are not allowed to see orders significantly earlier than others, or companies must release information at the same time to all investors, including annual reports and ad hoc messages.

The third kind of regulation is “conduct regulation”. In the FinTech area, data protection, privacy regulations, and marketing and distribution systems are also included in direct conduct regulation and define the level of protection that customers may expect from regulated institutions and their partners in this area. Customers are not in a position to audit their provider's

systems and processes in this respect and might not even be able to determine whether or not the protections provided in the terms and conditions are adequate.

The last regulation is public interest regulation which refers to the set of rules and regulations established by governments and regulatory bodies to protect the interests of the public in the financial sector.³³⁶ This type of regulation aims to promote the stability and integrity of the financial system, prevent financial crimes and abuses, and ensure that financial institutions act in the best interests of their clients and the broader public.³³⁷ Examples of public interest regulations in financial regulation include deposit insurance, capital and liquidity requirements, consumer protection laws, Volcker Rule (restricts banks from speculative investment) and mortgage lending standards.³³⁸ The goal of these regulations is to promote transparency, fairness, and stability in the financial system, while protecting the interests of consumers and society as a whole.

2.3 FinTech self-regulation in China and the U.K.

As for industry self-regulation, the China Internet Finance Association was formally established in March 2016 in accordance with the "Guiding Opinions on Promoting the Healthy Development of Internet Finance."³³⁹ The association is considered to be an essential measure in building a financial regulatory mechanism that effectively coordinates industry self-discipline and industry regulation in the field of financial technology in China. It has strong data statistics and provides data statistics support for Internet financial regulation. Since 2016, the Association has formulated the "Internet Financial Statistics System" and has developed and launched an Internet economic statistic monitoring system.³⁴⁰ Then it strengthens risk monitoring and early warning to provide timely risk information for Internet financial regulation. Moreover, it

³³⁶ Securities and Exchange Commission, "What is Financial Regulation?"

<https://www.investor.gov/introduction-investing/investing-basics/glossary/financial-regulation>

³³⁷ International Monetary Fund, "Why Do We Need Financial Regulation?"

<https://www.imf.org/en/News/Articles/2018/04/17/sp041718-why-do-we-need-financial-regulation>

³³⁸ Public Citizen, "What is Public Interest Regulation?" <https://www.citizen.org/what-is-public-interest-regulation/>

³³⁹ PBOC, 'Guidelines on Promoting the Healthy Development of Internet Finance' (2015) <http://www.gov.cn/xinwen/2015-07/18/content_2899360.htm> accessed at December 22nd 2020

³⁴⁰ Yan Zhou, 'Internet Finance Association Internet Finance Statistics Monitoring System is online' (2017) FN <https://www.financialnews.com.cn/if/if/201708/t20170830_123675.html> accessed 22 October 2020

accelerates a centralized registration disclosure platform to provide comprehensive verification information for regulation.

P2p lending is a classic case of the U.K.'s self-regulation approach. The core of the U.K. regulatory model on p2p lending is industry self-discipline first and regulation after. Industry self-discipline and government regulation complement each other. In 2011, the UK Peer to Peer Finance Association (P2PFA) was established. The trade body counted many of the leaders in peer-to-peer lending as members and served as the leading voice when it came to working with regulators in the UK such as Zopa. This new trade association has been setup to ensure that the sector "maintains high minimum standards of protection for consumers and small business customers." After the association, the FCA issued "The FCA's regulatory approach to crowdfunding over the Internet and the Promotion of non-readily realizable securities by other media" in 2014, and it is the world's first regulation in the world to regulate p2p lending.³⁴¹ For the better operation of the market, three operational goals have been set: First, financial consumer protection goals-to ensure adequate protection of financial consumers; second, integrity goals-one to protect and improve the integrity of the U.K. financial market; Third, competitive Goal-Promote effective competition in the financial market from the perspective of financial consumer interests.

The U.K.'s overall attitude towards p2p regulation is supportive, but it is not excessively laissez-faire. Only in this way can it be ensured that there is sufficient regulatory protection when risks arise in the early industry. FCA conducted a detailed market survey before intermediary industry regulation and concluded that government intervention in regulation would help reduce the risk of mispricing, platform default, and fraud faced by the market, make the market more effective, and attract more investment. On this basis, the "Regulation Method" was formally implemented in 2014 to supervise the company's business activities. As the regulated intermediary has increased lenders' confidence, the size of the U.K. market has grown rapidly. Contrast this with the Chinese market. For example, China's first online lending platform, Paipaidai, came out in August 2007. Later, online wealth management products such as Yuebao and third-party payment platforms such as Alipay and WeChat Licitong have all come out. During this period,

³⁴¹ Jianguo Jin, 'p2p online lending risk and regulatory optimization path exploration-inspiration from the regulatory system of the United States and the United Kingdom', (2019) 15 BER 169

there was almost no regulation for online p2p lending until the E Zubao scandal happened. It took more than three years for the special regulation of Internet Finance to begin only after the scandal. By the end of 2020, the risk of the stock of p2p loans has decreased significantly, and the number of p2p lending institutions has been reduced to zero while the British market is still booming.

From the p2p self-regulation case, when trying to regulate disruptive technology, self-regulation could be a good choice. Compared to direct government regulation, self-regulation is more flexible and context-driven because private entities actively participate in regulated market activities, and they are able to respond to market conditions changes faster and more effectively. The self-regulation approach is not simply advocating dismantling the regulatory state in favor of a free market and purely private mechanisms of social ordering. The FinTech regulation, some degree of self-regulation is beneficial for FinTech development. However, the most critical of this is how to find the balance between direct government regulation and self-regulation. For FinTech, different technologies have their own characteristics, so the balance point may also be differentiated.

3. Why does FinTech need regulation?

The FinTech industry needs appropriate regulation, which is determined by the characteristics and nature of the FinTech industry. Traditional financial regulation sometimes ignores the systemic risk posed by dispersed small players. And in the FinTech industry, small players may have a greater incentive and ability to engage in excessive risk-taking than larger, more established players. In fact, the FinTech industry has the following three characteristics that require regulatory intervention. First, FinTech has led to a proliferation of small, decentralized actors that may be more vulnerable to external shocks than traditional financial institutions, especially as they are not subject to regulatory capital or liquidity rules.³⁴² This matches the maintain the stability objective of financial regulation. Second, FinTech companies operate significantly more opaquely than traditional large financial institutions, making it difficult for

³⁴² William Magnuson, 'Regulating FinTech' (2018) 71 Vand L Rev 1167

regulators to effectively monitor their activities.³⁴³ This is also the requirement of improving market efficiency in the goal of financial regulation. Third, compared with large financial institutions, FinTech companies are less constrained by reputational constraints due to their small size and strong dispersion.³⁴⁴ Therefore, FinTech companies may often not care about corporate reputation issues considered by traditional companies, and their actions may be even more irresponsible, which may harm the market or customers. This characteristic will damage the competitiveness of the market, which is the fifth objective of financial regulation.

The indifference of financial technology companies to the company's reputation may cause bad money to drive out good money. The market will only be filled with companies with poor reputations, making the market uncompetitive. And the market become the “lemon market” and loss the investors and buyers eventually.³⁴⁵ When there is information asymmetry between buyers and sellers in the market, the quality of goods in the market will always decline.³⁴⁶ A famous information asymmetric example is the lemon market.³⁴⁷ Lemon is an American slang term for a car whose quality is found to be defective after purchase, and a high-quality old car is called a peach in American slang. In the used car market, sellers have more information about used cars than buyers, and there is an information asymmetry between them. But since the buyer has no way of knowing the true quality of the product (for example, suspecting that the other party is shoddy), the only way is to lower the price to avoid the risk of loss caused by information asymmetry. So, no matter how good the seller's used car is, the buyer will not pay a high price. After a certain period of time, the price is lowered again as buyers still cannot judge the quality of the used car. Due to such a vicious cycle, low-quality products flood the market, and high-quality products are driven out of the market. Finally, the quality of goods in the second-hand car market is getting worse and worse, reducing the overall welfare of society. For example, it is impossible to buy high-quality second-hand cars; too many low-quality used cars cause traffic accidents, and finally, the market breaks down.

This point is also the goal of improving market competition and protecting investors in financial regulation. And the example of the financial technology industry in the past ten years also proves

³⁴³ Ibid.

³⁴⁴ Ibid.

³⁴⁵ George A Akerlof, 'The market for "lemons": Quality uncertainty and the market mechanism', *Uncertainty in economics* (Elsevier 1978)

³⁴⁶ Ibid

³⁴⁷ Ibid

that if FinTech companies, services, and products do not have appropriate regulation, it may lead to the ultimate depression of the market.

3.1 The p2p loan in China

Ezubao is a peer-to-peer lending company in China, and it is considered to be the biggest Ponzi scheme in Chinese history.³⁴⁸ P2p lending is a modern investment system, which connects individuals or businesses with lenders through an online service, and China's p2p market is the largest in the world, which was about US\$150 bn in 2015.³⁴⁹ At that time, the market's lack of market entrance thresholds, sound regulations, and regulatory oversight led to a rapid proliferation of online p2p lending platforms. Because all of these platforms operate independently and do not affiliate with any authorized banks or financial entities, hence, they are not considered financial entities sanctioned by financial regulators. Ezubao was founded in July 2014 by the financial holding company Yucheng, and it grew so fast that attracting many people who were not qualified for loans from Banks. Ezubao promised a return on investment between 9 percent to 14.6 percent. The lending business of Ezubao grew quickly until some investors reported suspicious inactivity in December 2015. At that time, Ezubao had already drawn roughly US\$ 7.6 billion from about 900,000 investors.³⁵⁰ The manager of the company created fictional borrowers who would pay high rates on loans, and out of 207 companies, which allegedly received investment from Ezubao, only one company received a loan.

³⁴⁸ Chad Albrecht and others, 'Ezubao: a Chinese Ponzi scheme with a twist' (2017)

³⁴⁹ Michelle WL Fong, 'China's Online Peer-to-Peer (P2P) Lending Platforms', *The Digitization of Business in China* (Springer 2018)

³⁵⁰ Albrecht (n 40) 258

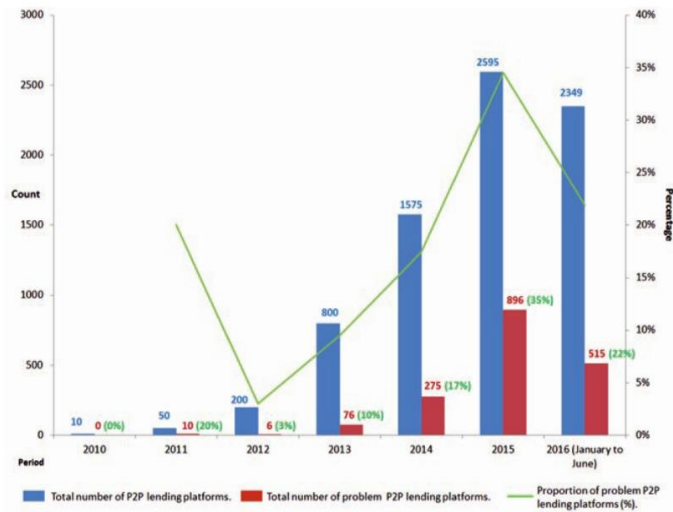


Table 2 Total number of online p2p lending platforms, the total number of problems online p2p lending platforms, and the proportion of problem platforms.³⁵¹

There was no regulation about p2p lending before Ezubao in China. With no structured auditing or accreditation guidelines, p2p lending in China has grown unchecked in the last ten years. The case of Ezubao has forced the government to speed up regulation in p2p lending. Under this circumstance, the CBRC (China Banking Regulatory Commission) released a draft of online lending, and it aims to offer a fully transparency p2p environment.³⁵² The draft also requires firms to report loan data to a national database, use the services offered by qualified banking financial institutions, and undergo annual unconcerned third-party audits. After Ezubao, Kumingfanya and Qianbao, and other online lending platforms were reported, the risk accumulated in the early stage of the FinTech broke out in an instant and was sweeping.

Then the Central Bank and other ten departments issued the "Guiding Opinions on Promoting the Healthy Development of Internet Finance," the state's regulation of the FinTech field

³⁵¹ WDZJ, (2020) < <https://www.wdzt.com/dangan/>> accessed on 8th November 2020

³⁵² At that time, The EZubao incident has brought a very large negative impact on the entire p2p industry, directly hitting the confidence of the entire industry. Under this circumstance, the state has issued 'Interim Management Measures for Online Lending.

changed from "wait-and-see" to appropriate regulation. However, this kind of appropriate regulation cannot resolve the large number of risks accumulated in the early stage. In 2016, the General Office of the State Council issued the "Specific Rectification Plan for Internet Financial Risks." The next day, the Central Bank urgently issued the "Special Rectification Plan for Risks of Non-bank Payment Institutions." The CSRC, CBRC, and other departments were launching equity crowdfunding and special online rectification of risks in the area, such as ending Internet asset management.

However, at this time, despite the efforts of regulation, frequent scandals and policy reversals have made many lenders no longer confident and interested in investing in the p2p industry. In a chain like P2P, the whole body is affected: investors (lenders) have no confidence and do not continue to invest; borrowers do not repay the money; the platform credit collapses; the capital chain is broken, and the chain is broken. The people go back and forth until the end of the industry.³⁵³ When the p2p company was completely cleared, another problem remained difficult to solve. In the process of successive withdrawal of P2P platforms, the platform should have assumed responsibility. P2P cannot afford too many bad debts. According to industry analysts, the bad debt rate of the banking industry cannot exceed 2%, and the normal bad debt rate of P2P is 3%-5%.³⁵⁴ There are nearly 800 billion yuan of inventory of non-performing assets. During the recovery process, if the borrower found is unable to repay, there is no way for the public security agency to recover or only recover the borrower with a larger amount of debt.

In general, China's p2p started early, but due to the excessive relaxation of early regulation, there was a long period of vacuum, which made it too late to take regulatory measures when the Ezubao incident occurred. The emergence of risk caused the rapid demise of the entire p2p market, and a large number of investors also suffered losses. Therefore, no regulation or delayed regulation could harm the market and might destabilize the market.

3.2 The p2p loan in the U.K.

³⁵³ Wei Wen, (n79).

³⁵⁴ *ibid*

The financial regulators in the United Kingdom did not initially include the p2p industry in the scope of financial regulation. The early development of the p2p industry has always been self-regulatory management through the industry self-regulatory association.³⁵⁵ The regulatory regulations of the p2p industry in the U.K. are mainly composed of national macro-financial laws and regulations, industry regulatory laws and regulations, and industry self-regulation.

The world's first p2p micro-lending company-Zopa was established in 2005. The regulation of the government of this area did not begin. In 2011, the Peer-to-Peer Finance Association (P2PFA) was established by three lending platforms: Zopa, Funding Circle, and Rate Setter.³⁵⁶ After that, the self-regulatory association issued a series of codes of conduct for the industry, including the "P2PFA Operating Principles" in 2012.³⁵⁷ In 2015, after major revisions, a new "Operating Principle" was issued, with 29 articles in total, and six high standards were proposed.³⁵⁸ This series of high-level standards provide the fundamental purpose for the standardized operation of online loan platforms and the protection of financial consumers. However, early time of this year (2015), the P2PFA disbanded as a platform and established a new group. The members in the P2PFA turn to a similar association named 36H Group, which is a sub-group within the FinTech trade body Innovate Finance.³⁵⁹ The new platform is open to all p2p lending platforms. Although the P2PFA no longer exists now, self-regulation is well inherited by the 36H Group.

After the establishment of the association, it took the initiative to apply to the British government to become a legal organization, requiring the government to supervise it; at the same time, it proposed ten specific operating rules that members of the association must comply with. This effectively maintains the discipline and credibility of the industry and plays a role in regulating

³⁵⁵ The self-regulation is the industry association which represents online debt-based alternative finance companies.

³⁵⁶ The P2PFA is the world's first online lending platform industry association. This association has been setup to ensure that the sector 'maintains high minimum standards of protection for consumers and small business customers. Rate Setter is a British peer-to peer lending company in London and founded in 2009. It claims that none of its individual investors have ever lost money. Funding Circle, which is founded in 2009, is another peer-to peer lending company that can lend money from public to small and medium size business.

³⁵⁷ The principles including senior management responsibilities, minimum operating capital requirements, secure and reliable IT systems and so on.

³⁵⁸ P2PFA, 'Peer-to-Peer Lending and the P2PFA' <https://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=27029&no=7> accessed at 17 October 2020

³⁵⁹ Peer2Peer Finance News, 'P2PFA disbands as platforms establish new group' (13 January 2020) <<https://www.p2pfinancenews.co.uk/2020/01/13/p2pfa-disbands-as-platforms-establish-new-group/>> accessed at 16th October 2020

and promoting the sustainable and stable development of the industry. There are currently eight member companies in the association, covering approximately 95% of the U.K. p2p reception market. However, because the association is binding on P2PFA members in principle, it is easier for member companies to gain the trust of financial consumers.

The British self-regulatory associations seem to be more reasonable and effective than China's "wait-and-see" approach. The core of the U.K. regulatory model on p2p lending is industry self-discipline first and regulation after. Industry self-discipline and government regulation complement each other; For the better operation of the market, three operational goals have been set: First, financial consumer protection goals-to ensure adequate protection of financial consumers; second, integrity goals-one to protect and improve the integrity of the U.K. financial market; Third, competitive Goal-Promote effective competition in the financial market from the perspective of financial consumer interests.

It can be seen that just before the official regulation of p2p in the U.K. was introduced, the Self-Regulatory Association largely guaranteed the stable development of the p2p industry. The U.K.'s overall attitude towards p2p regulation is supportive, but it is not an excessively wait-and-see approach. Only in this way can it be ensured that there is sufficient regulatory protection when risks arise in the early industry. FCA conducted a detailed market survey before intermediary industry regulation and concluded that government intervention in regulation would help reduce the risk of mispricing, platform default, and fraud faced by the market, make the market more effective, and attract more investment. On this basis, the "Regulation Method" was formally implemented in 2014 to supervise the company's business activities. As the regulated intermediary has increased lenders' confidence, the size of the U.K. market has grown rapidly.³⁶⁰ Contrast this with the Chinese market. Similarly, the official regulation tried to intervene, and China's p2p lending market eventually went to extinction, while the British market is still booming. The above examples show that for this kind of destructive technology, appropriate regulation should be adopted according to its characteristics. Neglect of regulation will lead to the loss of competition in the market, damage the interests of investors, and eventually lead to market collapse.

³⁶⁰ Nigel Culkin, Ekaterina Murzacheva and Andrew Davis, 'Critical innovations in the UK peer-to-peer (P2P) and equity alternative finance markets for small firm growth' (2016) 17 *The International Journal of Entrepreneurship and Innovation* 194

4. The ICO regulation

The regulation of ICO and cryptocurrency is usually simultaneous, and the content of regulation is roughly the same. This is because cryptocurrency, as a product of the ICO process, is usually supervised together, and their relationship is usually accompanied by each other.³⁶¹ Cryptocurrencies are the native asset of a blockchain like BTC, RBTC, and ETH.³⁶² The token is a type of cryptocurrency that represents an asset or specific use and resides on their blockchain. Their behavior is not built into the blockchain software itself. Instead, their behavior comes about through implementations in smart contracts. ICO is the source of tokens and digital currencies, so when the regulator tries to regulate the cryptocurrency and tokens, they usually start with ICOs. A typical example is the 2017 seven departments joint announcement of China.³⁶³ In the announcement, Article 1 stipulates that ICO is an illegal financing activity, Article 2 stipulates that no one shall engage in ICO-related activities, and Article 3 stipulates the illegality of token transactions and that any platform shall not provide Token transaction service. The announcement also mentioned that ICO projects in China have raised 'virtual currencies such as Bitcoin and Ether from investors, and it is an illegal public financing behavior without approval.³⁶⁴ Therefore, the regulation of ICO and tokens is usually carried out simultaneously, and the poor performance of tokens may cause regulators to lose confidence in ICOs.

At present, various countries in the world have different regulatory policies for ICOs. Some countries like Algeria, Bolivia, Morocco, and Vietnam have highly stringent regulations and

³⁶¹ ICOs are another form of cryptocurrency that businesses use in order to raise capital. Through ICO trading platforms, investors receive unique cryptocurrency "tokens" in exchange for their monetary investment in the business. For more details see chapter 2 ICO section.

³⁶² BTC has been the generally accepted abbreviation for Bitcoin stemming from the early days of Bitcoin; RBTC, or the RSK Bitcoin (RBTC), is the RSK token used to pay transaction fees for smart contracts on the RSK(open-source sidechain platform that hosts smart contracts) blockchain; ETH means Ethereum which is used for a variety of innovative applications in finance, web browsing, gaming, advertising, identity management, and supply chain management.

³⁶³ PBOC, 'Announcement on Preventing the Risk of Token Issuance Financing' 2017 <http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3374222/index.html> accessed May 15th 2021

³⁶⁴ Ibid.

prohibit all cryptocurrency transactions.³⁶⁵ Although some countries like Spain and Belarus do not regard cryptocurrency as a legal tender, they have seen the technological potential behind it and are developing a cryptocurrency-friendly regulatory system to attract investment in technology companies with outstanding performance in this field.³⁶⁶ At the same time, whether ICOs need to be regulated and what level of regulation is needed has always been the focus of debate.

4.1 The necessity of ICO regulation

Based on the p2p case discussed above, disruptive technologies will not work in the early days with overly loose passive regulation. The same is true for ICOs. For details, please refer to the situation of Bitcoin and other encrypted digital currencies in China. The basic technology of ICO is blockchain, and it has some disadvantages that might cause credit risk. The regulation of ICO is necessary because the token it generates is likely to deviate from the financing role and can easily be used as a criminal tool for money laundering, drugs, hacks, thefts, and terrorism, thus losing its own financing value.³⁶⁷ This is also the goal that financial regulation has always achieved, preventing financial crimes. It is estimated that one-quarter of Bitcoin users are likely involved in illegal activity, and about \$76 billion of illegal activity per year involves Bitcoin, which is almost the same scale as the U.S. and E.U. markets for illegal drugs.³⁶⁸ The most criticized problem of cryptocurrencies is that it is often used for money laundering. The first reason is that the transactions are pseudonymous, and regulators are it hard to track the trace of the money flow.³⁶⁹ Besides, the lack of transparency of ICOs makes it difficult for regulators to ascertain the real purpose of ICO funding. Although lack of transparency is also one of the problems for the traditional way of funding, due to the lack of proper regulation and standardized industry standards, ICO is less transparent than traditional financing methods and prone to

³⁶⁵ On May 21st, The Financial Stability and Development Committee of the State Council of China held its 51st meeting. The Financial Committee specifically emphasized the crackdown on Bitcoin mining and trading, and resolutely prevent individual risks from being transmitted to the social field. From this view, China should also be divided into the ranks of strict supervision.

³⁶⁶ Rebecca M Nelson, 'Examining Regulatory Frameworks for Digital Currencies and Blockchain' (2019) 26 Congressional Research Service Retrieved November 2020

³⁶⁷ The FBI has investigated that over \$4 million worth of Bitcoin from the dark net "Silk Road", and the scale of the problem is worth noticing for the regulators.

³⁶⁸ Sean Foley, Jonathan R Karlsen and Tālis J Putniņš, 'Sex, drugs, and bitcoin: How much illegal activity is financed through cryptocurrencies?' (2019) 32 The Review of Financial Studies 1798

³⁶⁹ Marc Pilkington, 'Blockchain technology: principles and applications', *Research handbook on digital transformations* (Edward Elgar Publishing 2016)

fraudulent projects. The last objective of financial regulation is to prevent financial crime in the market. If there is no appropriate regulation on for ICO, there will be more money laundry and fraud cases. Market failure will happen and investors will quit the money to protect themselves. This goes against our original intention of protecting and developing the ICO market. Hence, in order not to make ICOs become criminal tools and convenient channels for money laundering, it is necessary to put regulations on them.

However, some believe that the regulation of ICOs and the technology behind them is counterproductive to their design since cryptocurrencies were born in the wake of the 2008 Financial Crisis when trust in financial intermediaries was at rock bottom. There was an urgent need for a credible decentralized way of trading away from financial institutions. ICO, a way of raising funds and issuing cryptocurrencies, has created "Cryptoanarchism," which refers to the use of cryptographic methods for anarchist purposes in the digital realm.³⁷⁰ Crypto anarchism has five principles: decentralized, equalitarian, self-managing, and empowering, based on local needs and support by other autonomous units in a non-hierarchical fashion.³⁷¹ Cryptoanarchism advocates the liberation of the individual in the digital age, and they act of their own volition and associate voluntarily with others while preserving their rights to privacy and autonomy.³⁷² As a result, ICO and digital currencies are designed to be decentralized, unregulated, and self-governing. In other words, they are the products of regulatory arbitrage. To regulate them would be contrary to what they were designed for and would be more likely to hamper their development, turning them into government-controlled instruments of trade and thus losing their value. Also, the free anarchists in the "cypherpunk" movement believe that anonymity means that the threat of violence diminishes because under proper privately encrypted communication, your online presence cannot be connected to your real life, and you will be free from the threat of violent retribution for the online transaction.³⁷³ Therefore, Cryptoanarchism believes that ICOs and digital currencies should be designed to be free from regulatory control, and anonymity can also reduce the problem of violence in transactions.

³⁷⁰ Usman W Chohan, 'Cryptoanarchism and Cryptocurrencies' (2017) Available at SSRN 3079241

³⁷¹ Tom Cahill, 'Co-operatives and anarchism: A contemporary perspective' (1989) For Anarchism: History, Theory and Practice 235

³⁷² Cryptoanarchism is the combination of Libertarianism and Anarcho-Syndicalism, typical examples are: Cryptocurrencies, DAOs (Distributed Asynchronous Object Storage), Wikileaks and Dark Markets.

³⁷³ Henrik Karlström, 'Do libertarians dream of electric coins? The material embeddedness of Bitcoin' (2014) 15 *Distinktion: Scandinavian Journal of Social Theory* 23

In fact, these statements from Crytonanarchism are debatable. First, total neglect and unregulation of any market may lead to the eventual loss of control of the market. This will make the market lose competitiveness and the effectiveness of market information, and ICO projects will be rife with scams and financial crimes. In this circumstance, the investors and users in the ICO market cannot be protected, and the market will eventually become a lemon market. For example, Classical Liberalism in the 1860s once prevailed, and it advocated a free market economy. However, the Great Depression in the early 1930s let economists understand that a total wait-and-see market would not work.³⁷⁴ As for the ICO case, the situation is similar. If allowed, it grows savagely, the ICO market cannot develop anymore. The p2p loan case in China could be an example that the regulator put little regulation on the p2p market, which eventually led to the market being flooded with fraud and financial crimes are frequent.³⁷⁵ Eventually, the p2p loan disappeared permanently from the Chinese market. ICO and p2p are both ways of funding channels. Due to the lack of regulation of p2p in China, fraud has occurred, and the Chinese government has to announce the suspension of all p2p lending platforms. If ICOs in other countries are also adopting a tolerant attitude, it might cause severe criminal problems, and finally, other countries will have to take measures to prohibit the issuance of ICOs.³⁷⁶ The result of p2p is that the investors lost faith in these platforms, and finally, the fund of the loan is replaced by the financial institutions, which deviates from the original value of p2p.³⁷⁷ The ICOs market in China has been involved with too many fraud cases, and it has dramatically affected the safety of investors.³⁷⁸ Finally, the ICOs in China ended up similar to p2p, the PBOC with the National Internet Finance Association of China (NIFA), China Banking Association(CBA), and Payment and Clearing Association of China has announced that no

³⁷⁴ Eric Helleiner, 'Economic liberalism and its critics: the past as prologue?' (2003) 10 *Review of International Political Economy* 685

³⁷⁵ One of the primary reasons for the downfall of P2P lending in China was the high number of fraudulent and risky platforms that emerged in the market. Many of these platforms promised high returns to investors but failed to deliver on their promises, leading to a large number of investor losses. The lack of regulation and oversight in the industry allowed many of these platforms to operate unchecked, leading to widespread fraud and financial losses.

³⁷⁶ China has banned all the ICOs and do not carry out business related to digital currency on May 19th 2021. See at Financial Times <https://www.ft.com/content/72ae88cd-bcbf-4779-ae2a-c743b09c8b73>

³⁷⁷ Yu Gao and others, 'A 2020 perspective on "The performance of the P2P finance industry in China"' (2020) 40 *Electronic Commerce Research and Applications* 100940

³⁷⁸ It is reported that China is one of the biggest markets for cryptocurrencies and 90% of ICOs operated in China are highly suspect as being associated with illegal fundraising or fraud while only 1% of funds raised through ICOs are sued for the development overseas. See at Hui Deng, 'The Regulation of Initial Coin Offering in China: problems, Progress and Prospects' 2018

institution may conduct business related to cryptocurrency.³⁷⁹ ICOs, eventually like p2p, were forcibly banned from the Chinese market. Therefore, it is not feasible to put no regulation on ICOs, since the classical liberal approach of relying only on the market mechanism to allow ICOs to develop freely is likely to lead to ICOs eventually becoming a tool of fraud.

Second, appropriate regulation of ICOs will help protect investors and maintain the stability of both ICOs and the traditional market, which is also the objective of financial regulation. The appropriate regulation of ICO can also prevent the fraud, ensure the compliance,³⁸⁰ and promoting innovation. Appropriate regulation of ICOs can also promote innovation in the market. It can help legitimize ICOs as a fundraising method and encourage more investors to participate. This can lead to more funding for innovative projects, which can benefit both the ICO market and the traditional market.

Moreover, the regulation on ICO can reduce the market volatility. The ICO market has always been volatile because of much speculation for dynamic pricing ICOs. For example, Bitcoin prices plunged \$10,000 in less than an hour on May 19th, 2021, from \$40,000 in one of the most severe drops since the world's most actively traded digital coin began its meteoric ascent to record peaks.³⁸¹ Then, it rebounded almost as spectacularly as it fell later in the day and continued its rebound and reached above \$42,300. In such a hefty price volatility market, all transactions on digital currencies are the behavior of investors at their own risk. In addition, in the stock market, there is a two-way causal relationship between investor protection and stock market development.³⁸² When better investor protection is expected, companies can issue more equity, leading to a broader stock market; in turn, more equity issuance expands the shareholder base and increase the political support for shareholder protection.³⁸³ The feedback loop may

³⁷⁹ Han Yu 'Financial institutions are prohibited from doing business related to virtual currencies, the three associations said in a statement,' Sina Finance https://finance.sina.com.cn/money/bank/bank_hydt/2021-05-19/docikmxzfm3374052.shtml#:~:text=%E5%85%AC%E5%91%8A%E6%8C%87%E5%87%BA%EF%BC%8C%E5%BC%80%E5%B1%95%E8%99%9A%E6%8B%9F%E8%B4%A7%E5%B8%81,%E8%B0%A8%E9%98%B2%E8%B4%A2%E4%BA%A7%E5%92%8C%E6%9D%83%E7%9B%8A%E6%8D%9F%E5%A4%B1%E3%80%82 accessed on May 22th 2021

³⁸⁰ ICOs are often used to raise capital, and as such, they may need to comply with securities regulations. Appropriate supervision can ensure that ICOs comply with securities regulations, which can help maintain the stability of the traditional market and protect investors.

³⁸¹ Eva Szalay, 'Bitcoin flash crash amplified by leverage and systemic issues,' Financial Times <https://www.ft.com/content/b26319f6-6cb7-4e0e-a0d9-bac71d9b8c34> accessed 27th May 2021

³⁸² Pagano and Volpin, 'Shareholder protection, stock market development, and politics'

³⁸³ Ibid.

result in multiple equilibria, with shareholder protection, market participation, equity issuance, and investment all being positively correlated across equilibria under certain conditions(see at chapter three).

Third, if the ICO market is not properly supervised, it may lead to market failure, so that a large number of investors will eventually fail to play a financing role in Green Finance. As discussed in the ICO risk above, and market failure theory. The ICO market is full of a lot of information asymmetry, which happens to be one of the main reasons for market failure. And if the market failure is not controlled, the lemon market that will eventually be formed will allow more investors to launch the ICO field. And the subdivision of green ICO will also lose a large number of investors. In this way, the goal of trying to finance Green Finance through ICO cannot be achieved.

Moreover, the ICO market has some risks like market risk, regulatory risk, liquidity risk and operation risk. Perhaps because the current overall volume of ICOs is still relatively small, market failures cannot seriously affect traditional markets. However, in recent years, ICO has continued to develop into various investment fields such as Green Finance. When the risk of ICO spreads in a certain subdivision, the possible risks will spread rapidly and affect the traditional subdivision. Therefore, proper ICO regulation is still needed, especially in niche areas, lest ICO market failures affect traditional markets.

4.2 ICO regulation and Market Failure

As it has been discussed in the previous chapter, the ICO has disadvantages like credit risks, information asymmetry, and high cost of entry. As for Green ICOs, credit risks and greenwashing will intertwine and eventually lead to market unstable. In fact, ICO in Green Finance also has the risk of facing market failure. It means the inability of a market economy to reach certain desirable outcomes in resource use.³⁸⁴ According to market failure theory, there are some causes of market failure: incomplete information, externalities, and public goods. This

³⁸⁴ Datta-Chaudhuri, 'Market failure and government failure'

section will analyze whether the characteristics of green ICO will lead to market failure according to the four causes of market failure.

In financial regulation, information asymmetry is the main issue to be addressed, often referred to as investor protection by regulatory agencies such as the SEC.³⁸⁵ The information asymmetry could lead to market failure. (for more details about market failure and information asymmetry see at section 2)

In the green ICO, the information asymmetry problem is particularly obvious. Because both ICO and Green Finance themselves face the problem of opaque information to a certain degree, this has led to a certain degree of information asymmetry between investors and ICO issuers.³⁸⁶ The information asymmetric of Green ICOs can lead to greenwashing problems and make investors lose confidence in Green ICOs. Like the effects on financial markets, in the Green ICOs market, the investors will suffer unfair treatment and also cause financial markets to shrivel or implode.³⁸⁷ This increases the risk of market failure.

Due to the asymmetry of information in the green ICO market, an imperfectly competitive market will be formed. In fact, asymmetric information is pervasive in financial markets. The incumbents can exploit their market power without investors even noticing it.³⁸⁸ The result is that in many areas of financial services, competition is far from perfect, and distortions associated with imperfectly competitive markets, compounded by information asymmetries, are prevalent: excessively high prices, poor quality service, and the sale of defective or inappropriate products. A competitive market is based on the existence of a large number of small producers, the free entry and exit of firms into and out of the market, and a large number of well-informed consumers who can switch between producers and suppliers cost-free. In the absence of these conditions, producers will be able to charge prices exceeding the cost of providing goods and services, and resources will not be allocated appropriately. The investors of the Green ICOs are a hard understanding of the progress of the green project entirely, and the understanding of the working mechanism of ICO may not be able to reach the level of general

³⁸⁵ Ibid.

³⁸⁶ About the information asymmetric problem of ICO and Green Finance will be discussed in more details in the Section 6.1.

³⁸⁷ Armour and others, *Principles of financial regulation*.

³⁸⁸ Ibid.

investors' understanding of financial products in the financial market. Then, the issuers can take advantage of their position to control the market. The green ICO market can quickly form a state of imperfect competition.

In such a market with asymmetric information and imperfect competition, investors can only avoid the adverse effects of the market on them if they remain rational. However, investors who cannot process information rationally may not respond this way. They may have biased, prejudiced beliefs about financial products and services, or they may be influenced by crowds and herds, or they may derive their beliefs from simple but inaccurate rules of thumb.³⁸⁹ The ICO market, Because ICO is a relatively immature market, its high returns have led to a large number of speculators.³⁹⁰ The celebrity effects should not be underestimated, such as the case of Li XiaoLai mentioned above.

From the above analysis, it can be seen that the ICO market is very prone to failure because it is inherently relatively asymmetric information. Moreover, market leaders can easily use this information to control the market, eventually forming a monopoly and ultimately preventing the effective flow of market resources. If the ICO market fails, then, like the lemon market mentioned above, ICO investors will avoid their losses by reducing their investment. In this way, the ICO market will gradually shrink, and projects that really need investment, such as green ICO projects, may not be able to obtain financial support. Green Finance loses a channel to obtain financing from the private sector. Therefore, ICO needs proper regulation. This kind of regulation needs to overcome the problem of information asymmetry and reduce the investment cost of investors. For green ICO, regulation is also required to reduce the possibility of project greenwashing.

³⁸⁹ Gilovich, Griffin and Kahneman, *Heuristics and biases: The psychology of intuitive judgment*

³⁹⁰ Giudici and Adhami, 'The impact of governance signals on ICO fundraising success'

Chapter 5 The regulation of Green ICOs in UK

In the previous chapter, it was discussed that appropriate regulation is essential for green ICOs. Otherwise, severe information asymmetry may lead to market failure. Investors could lose confidence in the green ICO market and choose to leave, consequently making it impossible to achieve the objective of utilizing ICOs for Green Finance. This chapter analyzes the current regulatory landscape of green ICOs in China and the United Kingdom, as well as the underlying reasons. Currently regulations primarily focus on ICOs and Green Finance, without specific measures targeting green ICOs. More details will be discussed in the following sections.

1. ICO regulation architecture in UK

The regulation of ICOs in the U.K. is very different from that in China. First, the U.K. has always adopted a wait-and-see attitude towards ICOs and cryptocurrencies and does not intervene too much, but this does not mean that there is no regulation. Second, regarding the formulation of regulatory rules, the U.K. adopts a mode of communication and discussion with the regulated party for regulation. In general, regulators of the U.K. are trying to classify existing cryptocurrency assets and classify them into the existing legal supervision system. As far as the current progress is concerned, to classify it forcibly into the existing system has provided a skeleton for supervision. However, due to the peculiarities of ICOs, there may be specific incompatibility problems in mechanically copying existing laws.

1.1 The regulatory structure and stance of the UK

The specific regulatory structure, however, depends on how the token or coin offered in the ICO is categorized. The Financial Conduct Authority (FCA) is the regulatory body that oversees ICOs. The FCA does not consider all ICOs to fall under its jurisdiction, but when they do, the regulatory requirements can be quite stringent. In its ICO guidance, the FCA has indicated that some tokens may be considered "specified investments" under the Regulated Activities Order (RAO), or may fall within the definition of "transferable securities" under the European Union's

Markets in Financial Instruments Directive II (MiFID II).³⁹¹ If tokens fall under either of these categories, the ICO may need to comply with the FCA rules and regulations.³⁹² The FCA suggest that substance of the token (and not the label used) will determine whether an instrument is a specified investment.³⁹³ On the other hand, if the ICO involves tokens that are considered to be e-money, it might fall under the Electronic Money Regulations (EMR). In this case, the ICO issuer would likely need to be authorized as an Electronic Money Institution (EMI) and comply with relevant regulations.³⁹⁴

In general, the regulatory stance on Initial Coin Offering in the UK is cautious but not prohibitive. In September 2017, the FCA released a statement on Initial Coin Offerings, outlining the risks that ICOs present and emphasizing the importance of understanding the regulatory environment for ICOs in the UK. In the statement, it describes about the risks associated with ICOs, such as high volatility, potential fraud, and lack of investor protection.³⁹⁵ In fact, the volatility, potential fraud and lack of investor protection are related to the information asymmetry problem as it has been identified in the Chapter 3. In addition, because the secondary market of tokens produced by ICO is full of speculative investors, and the market fluctuates greatly, it also leads to volatility. However, they also acknowledge that ICOs can be a legitimate fundraising method for innovative projects. Compared with the UK, the Chinese market may have more fraudulent ICO projects due to factors such as the regulatory environment, population size, and regulatory enforcement. For businesses issuing tokens through ICOs, the FCA has published guidance to help them understand whether their activities fall under the FCA's regulatory remit.

2. The regulation of security tokens

2.1 The regulatory framework on security tokens

³⁹¹ FCA, 'Guidance on Cryptoassets Feedback and Final Guidance to CP 19/3', (2019). MiFID II was implemented in the UK before Brexit and remains part of UK law.

³⁹² Ibid.

³⁹³ Ibid.

³⁹⁴ Ibid.

³⁹⁵ Financial Conduct Authority, 'Initial Coin Offerings,' news release, September 12, 2017, <https://www.fca.org.uk/news/statements/initial-coin-offerings>

When the U.K. supervises ICOs, it does not uniformly supervise ICOs as a whole but classifies and supervises ICOs according to the different functional types of tokens. The FCA issued PS19/22 Guidance on Cryptoassets in July 31st2019. The guidance was opened for consultation on January 23rd, 2019. The Final Guidance will help market participants to understand whether the cryptoassets they use are within the regulatory perimeter. This will alert market participants to pertinent issues and should help them better understand whether they need to be authorized and what rules or regulations apply to their business.

However, the Guidance focuses on providing perimeter guidance (whether cryptoassets fall within or outside the perimeter. The use of DLT systems creates questions around certain activities and processes like custody, and settlement. While issues which are not perimeter (and therefore out of scope for the PS), it recognizes these areas are impacted by DLT. FCA are monitoring developments in these areas and stand ready to engage with market participants as the market matures. Market participants should use the Guidance as the first step in understanding how they should treat certain cryptoassets, however definitive judgements can only be made on a case-by-case basis. Firms should supplement the Guidance with the FCA's Perimeter Guidance Manual (PERG).

According to the Guidance (Policy Statement) issued by FCA, the crypto assets can be divided into two categories: unregulated tokens (exchange tokens and Utility tokens) and regulated tokens (security tokens and E-money tokens).³⁹⁶ Since this chapter is about Green Finance and ICOs, it will focus on the security tokens.³⁹⁷ The regulated tokens are regulated by the FCA, either under FSMA or the EMRs. Security tokens are within the FSMA regulatory scope, E-money tokens are within the FSMA regulatory scope as well.³⁹⁸ If issued by a credit institution, a credit union or a municipal bank, and are also regulated under the EMRs. The unregulated

³⁹⁶ Financial Conduct Authority, "PS21/2: Guidance on Cryptoassets Feedback and Final Guidance to the Market," January 2021, <https://www.fca.org.uk/publication/policy/ps21-2.pdf>.

³⁹⁷ The E-money tokens refer to any token that reaches the definition of electronic money in the EMRs. In the EMRs, the definition of E-money is electronically stored monetary value that represents a claim on the issuer, issued on receipt of funds for the purpose of making payment transactions; accepted by a person other than the issuer. The unregulated token refers to the tokens can be centrally issued, decentralized, primarily used as a mean of exchange or grant access to a current or prospective product or service.

³⁹⁸ See at The Financial Services and Markets Act 2000 (Regulated Activities) Order 2001.

tokens are exchange tokens and utility tokens, and any token that is not a security token or an E-money token is an unregulated token.

The security tokens mean the tokens with specific characteristics that meet the definition of a Specified Investment, like a share or a debt instrument as set out in the RAO (Regulated Activities Order).³⁹⁹ In the RAO, the Specified Investment takes the enumerated methods such as deposit, electronic money, contract of insurance, share and stakeholder pension scheme. To be specific, the security token is classified as “tokens provide rights and obligations” and also including the financial instruments under MiFID II framework (U.K. legislation and rules regulating markets in financial instruments).⁴⁰⁰ For example, security tokens might have some features akin to traditional instruments like shares, debentures, or unites in a collective investment scheme. If a token has these characteristics, it will be divided into securities supervision. From this point of view, companies financing through ICO and promising to give investors a particular share or provide sure profits in the future should be classified as security tokens in the U.K.

In this sense, the tokens generated by Green ICO are security tokens. That is because the green projects need to raise fundings from the investors, and the issuers will give investors rights to profits, revenues, or decision-making in an enterprise rather than the right of utility. Therefore, it may be classified as security tokens. For the judgment of the nature of tokens, it mainly depends on what kind of rights the organizations or groups that issue tokens give investors.

Then, if one ICO token is classified as security token, the issuer should obtain necessary permissions or licenses from the FCA before issuing the tokens. This may involve four aspects: first, registering with the FCA as an authorized firm; second, complying with the FCA's rules and principles for businesses, which include maintaining adequate financial resources, ensuring fair treatment of customers, and providing clear and transparent information; third, ensuring that security token offering (STO) complies with the FCA's rules on financial promotions, including

³⁹⁹ Ibid.

⁴⁰⁰ MiFID II cover firms that provide services to clients linked to ‘financial instruments’ (generally: shares, bonds, units in collective investment schemes and financial and commodity derivatives), and the venues where those instruments are traded. see at FCA ‘Regulation of markets in financial instruments.’

providing balanced and accurate information to potential investors; fourth, adhering to reporting and disclosure requirements, which may include periodic financial reporting, transaction reporting, and disclosing significant events or changes to the FCA.⁴⁰¹ Therefore, if one green project would like to issue green tokens, the founder needs to satisfy these four requirements.

This is quite different from IPO, while the process is overseen by the FCA, the company itself doesn't necessarily become an FCA-registered firm just by virtue of listing its shares. However, the company offering the STO might need to comply with more rigorous FCA rules because it's not just offering a security but also engaging in activities related to financial services. STOs, being more clearly tied to real-world assets or equity and falling under securities regulations, can be more highly regulated than traditional IPOs. Meanwhile, ICOs, depending on their nature, might be about real-world financing, but many have been seen as purely speculative instruments. The FCA and other global regulators have been working to clarify and strengthen regulations around STOs and ICOs to ensure investor protection and market integrity.

As it has been discussed before, the ICO has the risk of money laundering. As a financing project with a high degree of information asymmetry, Green ICO is also likely to be used as a tool for money laundering. Thus, Anti-money laundering (AML) and Know-your-customer (KYC) are relevant. AML regulations are designed to prevent the use of financial systems for money laundering or financing of terrorism. As an issuer of security tokens, it is necessary to establish and maintain AML policies and procedures, including: conducting risk assessments to identify and mitigate the risk of money laundering and terrorist financing; implementing customer due diligence (CDD) measures, such as verifying the identity of customers and beneficial owners, and assessing the risk associated with each customer; monitoring transactions and customer relationships for suspicious activities and reporting any such activities to the relevant authorities; maintaining records of customer identification and transaction data for a specified period, typically five years; and provide regular AML training to relevant employees.⁴⁰²

⁴⁰¹ Ibid (n 1)

⁴⁰² The Money Laundering, Terrorist Financing, and Transfer of Funds (Information on the Payer) Regulations 2017, SI 2017/692.

Know-your-customer (KYC) requirements are part of the broader AML regulations, and involve collecting and verifying the identity of customers. The primary objective of KYC is to ensure that a person or entity is who they claim to be, reducing the risk of fraud. By verifying the identities of parties involved in a transaction, it becomes more difficult for fraudsters to misrepresent themselves and scam investors. Security tokens are digital assets that are subject to securities laws in many jurisdictions. KYC procedures ensure that all transactions comply with relevant regulations, thereby protecting investors from illegal activities that might result in fines or legal action. By knowing their customers, issuers of security tokens can better manage risk. For instance, they can avoid doing business with entities involved in illegal activities, or with those who have been involved in fraudulent activities in the past. This protects investors by mitigating potential risks associated with these entities. For the issuers of security tokens, it is also needed to follow KYC procedures, which include: first, Collecting identification documents from customers, such as passports, national ID cards, or driver's licenses. Second, verifying the authenticity of these documents and the identity of the customers. Third, screening customers against sanctions lists, politically exposed persons (PEP) lists, and other watchlists. Fourth, obtaining information about the nature and purpose of the customer's business relationship with your firm. Fifth, monitoring customer activity on an ongoing basis and updating customer information as needed.⁴⁰³

2.2 Other regulation on security tokens

There are also some regulations on ICOs and tokens, but they are more fragmented and incomplete, and it can be summarized as the supervision of marketing, the supervision of anti-money laundering, and fraud. As it has been introduced above, marketing for Initial Coin Offerings (ICOs) involves various promotional strategies and tactics aimed at attracting investors to participate in a blockchain-based fundraising event. ICO marketing is crucial because it helps to spread awareness about the project, its utility, and potential returns, aiming to attract as many investors as possible. The projects in the real world could include: development of new cryptocurrencies, decentralized platforms smart contract platform, decentralized exchanges, decentralized file storage solutions), financial services (lending

⁴⁰³ Gov.UK, 'Guidance, Know your customer guidance accessible version,' (2016)

platforms, prediction markets, asset management platforms), gaming and virtual goods, supply chain solutions, social media and content creation.

The common way of ICO marketing is through whitepaper, website, social media and online forum, public relations and media outreach and influencer marketing. Since these marketing methods are non-mandatory disclosure of information, there is a high risk of information asymmetry. For the marketing of ICOs, there are specific rules in FSMA 2000 for financial promotions and misleading statements and impressions. In Section 21 of FSMA, it stipulates that “a person must not, in the course of business, communicate an invitation or inducement to engage in investment activity unless the promotion has been made or approved by an authorized person or it is directed at a person who falls into one of the exempt categories of the recipient and meets a series of tests.”⁴⁰⁴ It provides the legal basis for the restrictions on financial promotions of the ICOs. The provision of section 21 of FSMA 2000 is in line with the behavior of ICO in marketing, which is about inviting a person to participate in the investment. The ICO marketing process is also trying to invite investors to join their projects online and to persuade individuals to participate in the investment of ICO projects.

Also, as it has illustrated in chapter 3 since ICOs might relate to fraud and scam, the Financial Service Act 2012 provide some legal basis for issuing the whitepaper. The reason is as follows: the investment in the Green Finance ICOs can be considered as specific investment. Since the tokens of the Green ICOs can be considered as certificates representing certain securities or rights to or interests in investments.⁴⁰⁵ The security token of Green ICOs can be considered as a certificate representing certain green securities or rights to or interests in green investments. If the token of Green ICOs can be regarded as security tokens, then it will meet the requirement of Part III of Regulated Activities Order.⁴⁰⁶ In the Article 80, it stipulates that certificate representing certain securities are considered to be specific investments.

⁴⁰⁴ See at Section 21 Financial Service and Markets Act 2000.

⁴⁰⁵ See at Article 80 and 89 of the [Regulated Activities Order 2001](#). The article 80 stipule that: (a) specific investment can be a certificate or other instrument which confers contractual or property rights in the condition: a. in respect of any share, debenture, alternative debenture, government and public security or warrant held by a person, (b) the transfer of which may be affected without requiring the consent of that person. Article 89 stipules that a specific investment can be any right to or interest in any other specified investment.

⁴⁰⁶ Ibid.

Since Green ICOs can be specific investments, section 89 and section 90 of FSA cover misleading statements and impressions, respectively. The section states that “a token issuer will commit a criminal offence if it knowingly or recklessly makes a materially false or misleading statement, or dishonestly conceals any material facts, with the intention of inducing, or it is reckless as to whether it might induce, another person to enter into, or to refrain from entering into a relevant agreement, for example, an agreement to subscribe for tokens.”⁴⁰⁷ Moreover, section 90 provides the basis for prosecution, it states that “whereby a token issuer will commit an offence if, among other things, it creates a false or misleading impression as to the market in, or the price or value of, a relevant investment in order to induce another person to acquire or subscribe for investments such as tokens.”⁴⁰⁸ These regulations provide a legal basis for investor protection when ICO promotes and is suspected of misleading investors.

2.3 The IPO prospectus regime and ICO Whitepaper

According to FCA introduction of ICO, ICOs bear resemblances to various traditional forms of capital raising, including Initial Public Offerings (IPOs), private securities placement, crowdfunding, or even collective investment schemes. Consequently, certain tokens issued through ICOs may be classified as transferable securities, thereby ICO may fall within the jurisdiction of the prospectus regulatory regime.

However, FCA uses the description of “may fall within” for the relationship between ICO and IPO prospectus system. Therefore, in principle, if an ICO possesses the attributes of securities, it should be within the regulatory scope of the IPO prospectus plan. However, due to the particularity of the ICO itself and its lack of circulation in the IPO market, the FCA does not specify in detail how to integrate the ICO and the prospectus regime. In addition, the ICO itself also has a document similar to the prospectus, that is, the Whitepaper. Companies seeking to raise finance through a Green ICO would be advised to structure their whitepapers as a prospectus (see at chapter 6). Therefore, at present, the FCA’s description of the relationship between the supervision of the ICO and the IPO prospectus regime is not clear.

⁴⁰⁷ See at section 89 Financial Services and Markets Act 2000 (Regulated Activities) (Amendment) Order 2002

⁴⁰⁸ Ibid section 90.

3. The regulation of Greenwashing in the UK

As discussed in the chapter three, the greenwashing risks of green ICOs are caused by the information asymmetry between green projects and ICOs themselves. For example, the vague claims, projects may use ambiguous terminology like "eco-friendly," "sustainable," or "green" without offering concrete details or definitions to support these claims. Also, the use of symbols or graphics that suggest environmental friendliness (like leaves, trees, or the color green) without having the credentials to back up those images. To avoid falling victim to greenwashing when evaluating green projects and ICOs, it's essential for investors and the general public to conduct thorough due diligence. Therefore, the regulatory issue of Greenwashing is particularly important when discussing green ICOs.

3.1 The Green Claim Code

The Green ICO could fall under the regulation of the Green Claim Code. The guidance is for all businesses who make environmental claims. The claims may be made by manufacturers, wholesalers, distributors and retailers.⁴⁰⁹ The claims may be made about goods or services, or particular components or aspects of them. They may also be made about a process or a brand or business as a whole. The guidance will also be of relevance to organizations who produce codes of practice and to third parties who develop certification schemes.⁴¹⁰ In the Green ICO case, the issuers or companies who explain the green projects to the public, they are making a green claim to the investors.

The Green Claim Code is a standard that sets out rules to help the green companies' environmental claims are genuinely green.⁴¹¹ Green claims, also referred to as "green" or "eco-friendly" claims, represent assertions that demonstrate the environmental advantages or reduced detrimental impact of a product, service, brand, or company. Numerous organizations employ such claims as a marketing strategy to promote their offerings. They achieve this through various

⁴⁰⁹ Gov.uk, 'Making environmental claims on goods and service', <https://www.gov.uk/government/publications/green-claims-code-making-environmental-claims-on-goods-and-services> accessed May 14th, 2023

⁴¹⁰ Ibid.

⁴¹¹ HM Government, Green Claims Code, 'https://greenclaims.campaign.gov.uk/#what_are_green_claims_' (accessed 2 April 2023).

means, including textual statements, symbols, emblems, logos, graphical representations, color schemes, and product branding.⁴¹² The Green Claim Code provides six points that the claim must follow:

1. the claim must be truthful and accurate: businesses must live up to the claims they make about their products, services, brands and activities.
2. the claim must be clear and unambiguous: the meaning that a consumer is likely to take from a product's messaging and the credentials of that product should match.
3. not omit or hide important information: claims must not prevent someone from making an informed choice because of the information they leave out.
4. only make fair and meaningful comparisons: any products compared should meet the same needs or be intended for the same purpose.
5. claims should consider the full life cycle of the product: When making claims, businesses must consider the total impact of a product or service. Claims can be misleading where they don't reflect the overall impact or where they focus on one aspect of it but not another.
6. be substantiated: businesses should be able to back up their claims with robust, credible and up to date evidence.

The HM government set out this code is because many companies are claiming their product, project and service is green but that is not always the case. The International Consumer Protection and Enforcement Network (ICPEN) and CMA conduct a global review of randomly selected websites, it found that 40% of the green claims made online are misleading to the consumers.⁴¹³ Thus, this code is aiming to ensure the claim made by the companies are not misleading.

⁴¹² Ibid

⁴¹³ GOV.UK, 'Global sweep finds 40% of firms' green claims could be misleading', GOV.UK, 2023, <https://www.gov.uk/government/news/global-sweep-finds-40-of-firms-green-claims-could-be-misleading> [Accessed 15 August 2023]

The CMA also published a Guidance: The Green Claims Code checklist, which provide 13 statements and the business should be able to answer yes or agree to these statements.⁴¹⁴ Some of the statements are: the Claim is accurate and clear for all to understand; the claim clearly tells the whole story of a product or service; or relates to one part of the product or service without misleading people about the other parts or the overall impact on the environment; where general claims (eco-friendly, green or sustainable for example) are being made, the claim reflects the whole life cycle of the brand, product, business or service and is justified by the evidence; the claim doesn't exaggerate its positive environmental impact, or contain anything untrue – whether clearly stated or implied and so on. Moreover, for the purpose to implement and use green claims responsibly, the CMA published another Guidance called: Making environment claims on goods and service.⁴¹⁵ It offers principles and examples that what the green claims should be and provide answers for specific questions. For example, the question like: “is the claim only true and accurate under certain conditions or with caveats and are these clear? and “is what I say liable to deceive consumers, even if it is literally true or factually correct?”. These questions and answers provide more details for the business to check their green claims to make sure there are not against the Green Claim Code. These Guidance can also be helpful to prevent some of the Greenwashing cases in the Green ICOs, especially for some green star-ups who cannot afford to pay for legal consultation fee.

3.2 Sustainability Disclosure Requirements (SDR) and investment labels

Currently, there are currently no in force laws and regulations against Greenwashing. However, FCA issued Consultation Paper named “Sustainability Disclosure Requirements (SDR) and investment labels”, and its core regulatory objective is tackling Greenwashing. Now, the consultation has closed and a Policy Statement will be published in Q3 2023. In this paper, it captures the core elements of the regime: sustainable investment labels; qualifying criteria that firms must meet to use a label; product- and entity-level disclosures; and naming and marketing

⁴¹⁴ GOV.UK, 'Green claims and your business', GOV.UK, 2023,

<https://www.gov.uk/government/publications/green-claims-code-making-environmental-claims/green-claims-and-your-business> [Accessed 15 August 2023].

⁴¹⁵ GOV.UK, 'Environmental claims on goods and services', GOV.UK, 2023,

<https://www.gov.uk/government/publications/green-claims-code-making-environmental-claims/environmental-claims-on-goods-and-services> [Accessed 15 August 2023].

rules.⁴¹⁶ For example, it proposes to introduce sustainable investment labels to distinguish between products according to whether they aim to invest: i. in assets that are environmentally and/or socially sustainable ('sustainable focus'); ii to improve the environmental and/or social sustainability of assets over time, including in response to the stewardship influence of the firm ('sustainable improvers'); iii in solutions to environmental or social problems, to achieve positive, real-world impact ('sustainable impact').

The proposed categorizations do not subscribe to any hierarchical structure; each product category has been meticulously designed to manifest a distinct asset profile and cater to diverse consumer preferences. The categories will be substantiated by a clearly defined set of objective criteria that mandate high standards of integrity and quality. These criteria encompass several dimensions including the specification of a particular objective, the investment policy and strategy, key performance indicators, attributes at the firm level (such as resources and Environmental, Social, and Governance (ESG) governance), and stewardship for investors. Stewardship, as delineated in the UK Stewardship Code 2020, refers to the responsible allocation, management, and oversight of capital with a long-term value creation for clients and beneficiaries in mind, ultimately resulting in sustainable advantages for the economy, the environment, and society.

For the information disclosure, the paper stipulates two levels: consumer-facing product-level and product and entity level.⁴¹⁷ Disclosures at the level of consumer-facing products play a crucial role. They need to be accessible and cater to the consumer's comprehension, aiding them in understanding the key aspects of sustainability related to an investment product. This encompasses the product's sustainability objective, its investment methodology, and its performance in relation to the defined objective. The requirement for these disclosures holds whether the product carries a sustainable investment label or not. However, it's worth noting that the depth and breadth of such disclosures will naturally be constrained for products that lack a label signifying sustainable investment.

⁴¹⁶ FCA, 'CP22/20: Sustainability Disclosure Requirements (SDR) and investment labels', 2022. <https://www.fca.org.uk/publications/consultation-papers/cp22-20-sustainability-disclosure-requirements-sdr-investment-labels> accessed 15th May 2023

⁴¹⁷ Ibid.

As for the disclosures at product and entity level, it contains more details about institutional investors or retail investors.⁴¹⁸ For example, disclosures made prior to contract finalization are pivotal in outlining the sustainability-related characteristics of an investment product, such as its sustainability goals and the associated investment policy and strategy. This sustainability-related information necessitates disclosure irrespective of whether the product utilizes a sustainability label or not. Products not adopting a label but integrating sustainability-related features central to their investment strategy—where the product bears specific sustainability features and the firm implements particular policies and procedures regarding these features—must also adhere to this disclosure mandate; the second disclosure is the ongoing sustainability related performance information in a sustainability product level report; as for the entity-level disclosures will be covered in a sustainability entity report. It offers how firms are managing sustainability related risks and opportunities. These disclosures must be regardless of whether an in-scope firm uses a label.

If the regulatory document on green labels can be promulgated smoothly, the classification of green labels in the UK will be clearer, and the information disclosure will be clearer. Since the green ICO belongs to the security token and is issued by the company, the organization needs to register with the FCA. Therefore, it will also receive corresponding supervision. The green projects of green ICO will also carry out information disclosure and classification according to regulations.

3.3 The regulation for misleading action

The Consumer Protection from Unfair Trading Regulations (CPUTR) is a UK law that is designed to protect consumers against unfair business practices. Whether or not an investor in an Initial Coin Offering (ICO) would qualify as a "consumer" under this law is a complex question that would likely depend on the specific circumstances of the ICO and the investor's role in it.

In general, the CPUTR defines a "consumer" as "an individual acting for purposes that are wholly or mainly outside that individual's trade, business, craft or profession". In the context of ICOs, if an individual investor were to invest in an ICO for personal purposes (as a form of

⁴¹⁸ Ibid.

speculative investment or to use the associated service) rather than as part of a business activity, then they might be considered a "consumer" under CPUTR. For the Green ICO investors might be considered as a consumer. But this is a grey area, and the interpretation could differ based on individual circumstances. In many cases, participants in ICOs are not clearly 'consumers' because they are purchasing tokens with the expectation of future profits, rather than to consume a product or service. That's more akin to an investor in a traditional sense, and could potentially fall outside the CPUTR's definition of a 'consumer.'

Since the green ICO needs to be promoted through social media during the marketing period, it may be in the form of advertisements or Whitepapers. Therefore, the misleading environmental claims will foul of the restrictions contained in the Consumer Protection from CPUTR.⁴¹⁹ In the PART 2 PROHIBITIONS, the misleading actions, it stipulates that A commercial practice is a misleading action if it contains false information and is therefore untruthful in relation to any of the matters in paragraph (4) (a) the existence or nature of the product (b) the main characteristics of the product... (d) the motives for the commercial practice.⁴²⁰ This offers a basic definition of misleading actions. It covers both company levels and product or service levels of green washing behaviors. In the green washing case, the green claim type like product orientation and claim deceptiveness like omission, false or outright lie, acceptable are included. Also, there is also a precondition for the determination of these series of behaviors that is these misleading actions should cause or is likely to cause the average consumer to take a transactional decision he would not have taken otherwise. Therefore, the prerequisite for the application of this clause is not only that the company or product has taken misleading behavior, but the actions must be sufficient to make consumers to make or change the transaction decision.

CPUTR addresses unfair commercial practices, including misleading actions or omissions, and aggressive commercial practices. In the context of greenwashing, the CPUTR could be relevant if a company's marketing or promotional materials contain false or exaggerated environmental claims that have influenced a consumer's decision to purchase a product or invest in the company.

⁴¹⁹ Consumer Protection from Unfair Trading Regulations 2008: Footnote: Consumer Protection from Unfair Trading Regulations 2008 (UK)

⁴²⁰ L Conway, 'Consumer protection from unfair trading regulations 2008' (2019) 4678 Paper no CBP

For example, imagine a hypothetical case where a car manufacturer advertises a new vehicle as "eco-friendly" and claims that it has zero carbon emissions. However, upon investigation, it is discovered that the vehicle does produce carbon emissions, and the manufacturer's claim is found to be misleading. In such a case, the CPUTR could potentially be invoked to protect consumers who have been misled by the false environmental claims. In the Green ICO case, if the issuer defines the project as green and environmentally friendly in green project's Whitepaper (such as integrating power resources through the blockchain for buying and selling), but through investigation, it is found that his project cannot achieve the purpose of saving power resources generated by it, at this time the green ICO project may have violated the CPUTR.

There are some other legislation or regulations that relates to the misleading action. For example: Business Protection from Misleading Marketing Regulations (BPMMR) 2008.⁴²¹ This legislation complements the CPUTR by focusing on misleading marketing practices that target businesses. It prohibits businesses from using misleading advertising to promote their products and services. Another regulatory body is the Advertising Standards Authority (ASA) and it is not a law. The ASA is the UK's independent regulator for advertising across all media.⁴²² It enforces the UK Advertising Codes, which set standards for marketing communications, including rules about misleading advertising, substantiation, and environmental claims. The ASA investigates complaints and can take action against companies that violate the Advertising Codes. For example, if the ASA ruled against an advertisement by an energy company that claimed to offer a "100% renewable" energy tariff. The ASA found that the claim was misleading because the company's energy supply was not entirely derived from renewable sources, and the company was required to remove the advertisement. ASA is involved in this case of Greenwashing because it is the UK's independent regulator responsible for ensuring that advertisements across all media, including online and social media, follow the UK Advertising Codes. The ASA plays a crucial role in maintaining high standards of advertising and protecting consumers from misleading or unsubstantiated claims. In the context of greenwashing, the ASA may get involved if a company's advertisement contains misleading, exaggerated, or false environmental claims. These claims could potentially mislead investors or consumers into

⁴²¹ Business Protection from Misleading Marketing Regulations 2008 (UK)

⁴²² Advertising Standards Authority, 'About ASA and CAP' <https://www.asa.org.uk/about-asa-and-cap.html> accessed March 15 2023

believing that the company or its products are more environmentally friendly than they actually are.

Another case in the advertising stage involved in Greenwashing problem from the UK is Ryanair flight company, which has declared itself to be “Europe’s greenest airline,” and “most fuel-efficient fleet.” As the Europe’s biggest airline, it also started running the adverts in the press, on the television and radio, billing itself as a “low CO2 emission airline.” However, it has been banned by the ASA, which has branded the statements “misleading.” The company claims that its “low emissions” credentials are a result of its young, more efficient fleet of aircraft and its high load factor (how full a flight is) of 97 per cent on average. Then, the ASA took issue with some of the assertions due to the evidence used to back them up. One of the airline efficiency rankings used by Ryanair to support its claims was from 2011. Hence, the company’s claim is a misleading action. Although Ryanair packed flights, it was also the only airline include in a list of Europe’s top 10 polluting companies from the EU’s Transport & Environment group in 2019.

According to the previous classification analysis on green washing, Ryanair made a green claim that is false or outright lie, and they used outdated evidence to support their current claim. They may also have a claim with image orientation since they proclaim themselves as “Europe’s greenest airline” and “most fuel-efficient fleet.” However, according to the Unfair Trading Regulations 2008, the requirement to meet the standard of misleading action is sufficient to generate or change the consumer’s decision. At present, there is no direct evidence that their behavior has reached a level sufficient to influence consumers’ choices, so only the ASA banned their advertising.

The last regulation is the Consumer Rights Act 2015.⁴²³ This act consolidates consumer protection laws in the UK, including provisions related to unfair terms and practices, and provides consumers with rights and remedies for products and services that do not meet legal standards. While it does not specifically address misleading claims, some of its provisions may

⁴²³ Consumer Rights Act 2015 (UK).

apply in cases where a product or service fails to meet the expectations created by false or deceptive advertising. Both the CPUTR and the 2015 Act are rooted in consumer protection, they have different scopes and mechanisms. The CPUTR focuses more on unfair trading practices, while the 2015 Act provides broader consumer rights across goods, services, and digital content. However, they both operate in the same landscape and are parts of the broader consumer protection framework in the UK. While both the CPUTR and the 2015 Act are concerned with consumer protection, the CPUTR specifically targets unfair trading practices, like misleading actions, misleading omissions, and aggressive practices. On the other hand, the 2015 Act is more comprehensive, dealing with the rights of consumers in relation to goods, services, and digital content. For the remedies, under the CPUTR, certain breaches can lead to criminal prosecutions, and those convicted may be fined or even imprisoned. The 2015 Act, meanwhile, offers civil remedies, letting consumers get a repair or replacement, some money back, or even reject the product and get a refund under certain conditions. As for the digital content (which is more related to ICO), a unique aspect of the 2015 Act is its focus on digital content, recognizing the growing importance and prevalence of digital purchases in the modern consumer landscape.

3.4 The regulation for misleading omissions

The misleading omissions is another Greenwashing behavior. The misleading omissions put more emphasis on the lack of information intentionally. Misleading omissions can certainly occur in the context of green ICOs in the UK, as they can in any form of investment offering. This could take place if an ICO does not provide sufficient, accurate, and clear information about the environmental or sustainable characteristics of the investment, potentially leading investors to make decisions based on incorrect or incomplete information. The FCA has guidelines that require financial promotions to be "clear, fair and not misleading." This includes green ICOs. Misleading omissions can potentially fall foul of these requirements and could result in sanctions by the FCA.

According to Part 2 regulation 6 of the Consumer Protection from Unfair Trading Regulation 2008, a commercial practice is a misleading omission if, in its factual context, taking account of the matters in (a) the commercial practice omits material information, (b) the commercial hides material information, (c) the commercial practice provides material information in a manner

which is unclear, unintelligible, ambiguous or untimely. These rules are in line with the classification of green claims deceptiveness about the vague or ambiguous omission and outright lie. One famous example of this is the Volkswagen emissions scandal, also known as Dieselgate, which is started in 2015 and found by the Environmental Protection Agency (EPA) firstly. Volkswagen had intentionally set their turbocharged direct injection (TDI) diesel engines to activate their emissions controls only during laboratory testing. The vehicles' NOx output complied with US standards during regulatory testing but went up to 40 times higher in real-world driving.⁴²⁴ In the UK, the Department for Transport announcement on 24 September 2015 stated that it was re-testing cars from various manufacturers to ensure that "defeat devices" were not used broadly across the industry.

In this case, it may have violated misleading omission since Volkswagen has hidden the real information of their products and try to cheat to pass the test. This kind of green washing behavior is from both the company level and product level. Volkswagen's executional green washing and product washing eventually led to a series of compensation lawsuits in the UK because they made the buyers believe they were getting a clearer car than was, in fact, the case.⁴²⁵ In the coming decades, this will pave the way for further greenwashing class actions.

4. The analysis of UK's regulation on Green ICO

4.1 Potential problems for the U.K.'s ICOs regulation

As the center of financial technology innovation, the United Kingdom has consistently been acclaimed for its relaxed environment that encourages technological innovation and its creative sandbox supervision. It is true that the United Kingdom has made great efforts to balance innovation and regulation, embedding ICOs into the existing legal framework. However, there are still some issues that are not being paid attention to, or because the supervision is still in the exploratory stage, it has not had time to make more appropriate adjustments.

⁴²⁴ Jae C Jung and Elizabeth Sharon, 'The Volkswagen emissions scandal and its aftermath' (2019) 38 Global Business and Organizational Excellence 6

⁴²⁵ Matthew Unsworth, 'Sustainability or spin? Greenwashing and the law' LC 2021 <https://www.legalcheek.com/lc-journal-posts/sustainability-or-spin-greenwashing-and-the-law/> accessed at July 15th 2021

First, as the ICO risks has been illustrating before, one of the risks about ICO is the money laundry. Whether it is an ICO or a green ICO, as long as it has anonymous transactions and non-traceable attributes, it can easily be used as a tool for criminal activities such as money laundering. ICO can potentially facilitate money laundering in several ways, largely due to the anonymity and cross-border nature of blockchain transactions. Cryptocurrencies are often associated with a certain level of anonymity, as transactions are tied to cryptographic addresses rather than the identities of individuals or entities. This can make it easier for money launderers to hide their identities. Also, cryptocurrencies can be sent across borders quickly and easily. This can make it difficult for authorities in any one country to monitor and regulate transactions.

For the AMT/CTF regime, the companies who carry ICOs need to register in the FCA. However, this does not mean that the FCA has assessed them as fit and proper, nor that FCA has determined their application for the purposes of the MLRs. In the FCA's description, unregistered companies are only "at-risk" of being subject to FCA's criminal and civil enforcement powers. Besides, the FCA also provided a list of unregistered crypto assets businesses companies. Moreover, even for companies registered under MLRs, it still does not mean that customers will benefit from the protections of the Financial Ombudsman Service or the Financial Services Compensation Scheme (FSCS). Since most of the ICOs are not specified investments under FSMA (up to 2023 August), it is unlikely that customers will have access to the Financial Ombudsman Service or FSCS.⁴²⁶ In this sense, The registration system of the anti-money laundering program does not provide much substantial help. It does not seem to provide any guarantee and support for enterprises. On the contrary, it is easy to be used as misleading propaganda by non-compliant companies to confuse investors to obtain FCA certification.

Second, As discussed earlier, much of the current regulation of ICOs in the UK is unclear. For green ICO, the supervision of greenwashing is more Consultation Paper and guidance. Although FCA has made clear regulations on the classification of ICOs, Green ICOs might belong to the classification of security tokens. A Green ICO, which aims to raise funds for environmentally friendly or sustainable projects, is not inherently associated with security tokens. It's the nature and promise of the token itself that determines its classification. If a Green ICO token represents a share in a green energy project, for example, and promises dividends from the project's profits,

⁴²⁶ Ibid (n 72)

it might be considered a security token. If it merely provides access to use renewable energy once the project is operational, without any profit expectations, it might be more of a utility token. But specifically, the issuance form, marketing, contract signing and other processes of green ICO are very different from IPO. There are no specific regulations on how green ICO or security tokens should be regulated in accordance with FCA regulations. The hidden dangers of high information asymmetry brought about by Green ICO cannot be effectively resolved due to the lack of these detailed rules.

Besides, forcing ICOs and tokens to apply the existing legal system may cause many incompatibility issues. For example, FSMA requires authorized companies to comply with, but not limited to, the following requirements: take appropriate steps to identify and assess the risks of money laundering and terrorist financing which the business is subject to; undertake customer due diligence (CDD) when entering into a business relationship or occasional transactions, and undertake ongoing monitoring of all customers to ensure that transactions are consistent with the business' knowledge of customer, the customer's business and risk profile. In fact, according to the report from KPMG, profitability has been hard to achieve for FinTech start-ups, and the trend has continued over the past 12 months.⁴²⁷ Also, due to FinTech companies relies more on technology than traditional startups, its staff and company size are relatively small. The requirements that the FSMA imposes on them may not be met in many cases, or they do not have the human resources and financial resources to comply. Many companies involved in Green Finance are start-ups. They already lack funding sources and manpower. Comply to FSMA, they may add a greater financial burden to them. Therefore, different levels of regulatory requirements should be applied to companies on a company-by-company basis. Otherwise, high compliance costs for many ICO companies may directly lead to regulatory evasion.

Third, with regard to ICOs project scams, the U.K. has not taken adequate regulatory measures. The FCA has made it clear that whether an ICO falls under their regulatory purview depends on how it's structured and what the tokens represent. If the tokens represent a claim on prospective services or revenue, they might be considered "specified investments" under the Regulated

⁴²⁷ KPMG, 'FinTech Pulse Report 2020' <<https://assets.kpmg/content/dam/kpmg/uk/pdf/2020/07/FinTech-pulse-report-2020.pdf>> accessed May 28th 2021

Activities Order, and therefore fall under FCA regulation.⁴²⁸ It means many ICOs are structured such that they do not fall under FCA regulation. In these cases, the FCA has focused on providing warnings to consumers about the high-risk nature of these investments and the potential for fraud. It also fails to protect consumers (investors), one of the previously discussed goals of financial regulation. Part of the reason may be that the market is small and does not cause the massive disruption that has occurred in China.⁴²⁹ For example, the quality of ICO's white papers and some indicators such as the detailed level of technical introduction and the degree of project information disclosure are proved to be highly correlated with the success of the project.⁴³⁰ In the ENERGI whitepaper, it covers current problems (admit the lack of governance and user protection), solutions (Ethereum-Compatible, funding, on-chain Governance, Speed and Scalability), Staking and Economic model(how it ensure stability and sustainability for the ecosystem).⁴³¹ ENERGI is a cryptocurrency that was designed with a strong focus on governance, self-funding, and smart contract capabilities. One of the standout features of ENERGI is its Treasury system. A significant portion of the block reward goes to the project's treasury, which funds development, operations, customer support, and more. This self-funding mechanism was designed to ensure the long-term development and success of the project without relying on external funding or an ICO. These revealed information make ENERGI a successful project and raised £ 2.1 million.⁴³² Therefore, regulators can provide some soft requirements to improve the quality of ICOs white papers, thereby increasing the success rate of ICOs projects. This can also provide investors with a certain degree of protection from the side.

4.2 The potential problems for Greenwashing regulation

⁴²⁸ Ibid (n 1)

⁴²⁹ While activity in the UK has grown in recent years, the number of firms carrying out cryptoassets activities in the UK remains small and the overall size of the UK market represents a small percentage of the overall global cryptoassets market. see at FCA 'Guidance on Cryptoassets' CP 19/3* 2019

⁴³⁰ Shadi Samieifar and Dirk G Baur, 'Read me if you can! An analysis of ICO white papers' (2021) 38 Finance Research Letters 101427

⁴³¹ Energi Core Team, 'ENERGI: A Comprehensive Cryptocurrency Platform', Whitepaper, 2021, <https://coinprika.com/storage/cdn/whitepapers/10693637.pdf> .accessed August 5th 2022

⁴³² Crunchbase, 'ENERGI Holdings', 2023, <https://www.crunchbase.com/organization/energi-holdings> accessed at 8 6th 2022

For the Greenwashing problem in the UK, there are few Guidance published by the CMA. The FCA also published Consultation Paper on Sustainability Disclosure Requirements (SDR) and investment labels. However, the guidance is only a suggestion, not enforceable, and CP has only completed the solicitation of opinions, and the specific anti-greenwashing standards have not yet been issued.

These guidelines are designed to give green companies in the UK a clear picture of whether they are involved in misleading behavior or greenwashing when making green claims. These guidelines, on the one hand, do provide guidance for companies to avoid green-washing problems, and on the other hand, provide consumers or investors with relief guidance when encountering Greenwashing problems. However, relying on these guidelines and CP to try to avoid greenwashing problems is not enough, and there are still many potential problems.

First, the voluntary nature of these Guidance weakens the effectiveness against Greenwashing issue. According to the Making environment claims on goods and services, it states that neither is this guidance and the principle, a substitute for the law itself. They cannot replace the role of the courts, which is to offer the definitive interpretation of consumer protection law based on the facts of each case. Thus, the Green Claims Code is voluntary, meaning that businesses can choose whether to adhere to the guidelines. Companies that choose not to follow the code may still engage in greenwashing practices, undermining its effectiveness. In the Green ICO case, if there is no effective restriction on the Greenwashing problem, the Greenwashing problem of green ICOs may become more serious. The Greenwashing behavior will turn the green financial market into a lemon market, and more consumers will choose to leave the market without investing. In this way, the goal of green ICO - to obtain funds from private sources cannot be achieved.

Second, as a voluntary code, the Green Claims Code does not carry the same legal enforcement mechanisms as regulations or legislation. This may limit the consequences for companies that violate the code, reducing the incentive for compliance. To be Specific, there is no legal penalties if the green company violates the code. Since the Green Claims Code is not legally binding, companies that violate the code may not face the same penalties, such as fines or legal sanctions, as they would for violating a formal law or regulation. This reduces the incentive for

businesses to comply with the code and makes it easier for some companies to engage in greenwashing practices. Also, there is limited oversight and monitoring in the code. Regulatory authorities, such as the Advertising Standards Authority (ASA) and the Competition and Markets Authority (CMA), may not have the same level of oversight and enforcement powers for a voluntary code as they do for legally binding regulations. This can make it difficult for these agencies to effectively monitor and enforce the guidelines outlined in the code. The inconsistent compliance is a flaw in the code. The voluntary nature of the Green Claims Code means that businesses can choose whether or not to follow the guidelines. For the investors, it is also hard to judge if the projects' claim has already followed the code or not. In addition, the voluntary nature can weaken the deterrent effect. The absence of legal enforcement can weaken the deterrent effect of the Green Claims Code. Companies might perceive the potential negative consequences of violating the code as less severe, making them more likely to engage in greenwashing practices.

Third, there are still some varying interpretations in the UK's Green Claims Code. The ambiguity in terminology can make the code become ineffective. For example, the Green Claims Code may use terms that are open to interpretation or lack clear definitions, such as "sustainable," "eco-friendly," or "low-impact." Businesses may interpret these terms differently, leading to varying levels of substantiation or rigor in their environmental claims. If one company might consider a product "sustainable" if it uses recycled materials, while another might only use the term if the entire production process has a low environmental footprint.

Also, the differing assessment approaches also make it difficult for consumers to compare the environmental impact of different green products. The CP22/20 might provide a clear classification in the future, but at present there is no enforceable rules. The code encourages businesses to substantiate their environmental claims using "sound scientific or technical evidence," but different businesses or industries may use different methods for assessing the environmental impact of their products or processes. For example, one company might measure the carbon footprint of a product using a life-cycle assessment, while another might focus solely on the emissions produced during manufacturing.

4.3 The effectiveness of Greenwashing regulation in UK

At present, it can be said that the UK has made some efforts in the supervision of greenwashing, but it cannot solve the fundamental problem of greenwashing. The current laws and regulations in the UK do have relevant regulations on misleading behaviors and concealment behaviors. But the connection between greenwashing and these practices is lacking. Since the Green Claim Code published by the British government is non-mandatory and has no penalties, many green companies are likely to choose not to comply in order to reduce their own costs and procedures. This may be even more true for green ICOs, as ICOs are well-suited for green start-ups, and the Green Claim Code may increase their compliance costs. When given the choice between voluntary regulatory requirements and cost reductions, project leaders may be inclined to reduce costs. This would make regulation useless. Therefore, green start-ups may be more inclined to choose to ignore the Green Claim Code. But this also greatly increases the risk of greenwashing startups. The current voluntary guidance on green statements in the UK may not achieve the goal of reducing greenwashing. Green companies, especially start-ups, are more likely to make misleading claims in order to reduce costs.

In addition, such soft and vague guidance may have little effect on protecting consumers or investors. According to polling from RED C Research, about 62% of the UK public found it is difficult to understand which brands are sustainable.⁴³³ One of the reasons is that there are 87 eco labels in the UK and there are no cohesive sustainability reporting standards across industries. For example, there AISE Charter for Sustainable Cleaning, Best Aquaculture Practices, Blue Angel, Rainforest Alliance Certified, SCS FloorScore, SEC Member Seal and so on.⁴³⁴ On the one hand, companies may not comply with such regulations. On the other hand, even if companies follow the guidelines and make green declarations that comply with the rules, it is difficult for consumers to make judgments when faced with green standards that are not unified. The supervision of Greenwashing should not shift part of the responsibility to consumers or investors.

As for the CP22/20, It does provide some green standards that allow companies to be classified into different green levels. But the official final document is still not out. It is also still unknown

⁴³³ REDC, 'Sustainability Headlines-March 2021: Brands Need to Simplify Sustainability,' (2021) <https://www.redcresearch.com/sustainability-headlines-march-2021/> accessed June 20th 2023

⁴³⁴ These labels can be found <https://www.ecolabelindex.com/ecolabels/?st=country.gb#R>

whether the green ICO will be able to be graded according to the final version of the document. Implementation issues for the final version of the CP are also still unknown. Moreover, it is still unknown how the green ICO projects that have been issued should be supervised.

In conclusion, the U.K. has made specific efforts in the supervision of ICOs, trying to rationally classify tokens into the existing regulatory system and provides a series of regulatory frameworks for crypto assets. Moreover, the U.K. has been trying to find a balance between innovation and preventing over-regulation. However, at present, there are still some rigid and impractical aspects in the supervision of anti-money laundering crimes. The Green Claim Code as an guidance is naturally voluntary which cannot solve the Greenwashing problem effectively. Although CP22/20 may provide a clearer standard for the classification of green enterprises in the future, the final version has not yet been released, and its final effect is difficult to evaluate. The supervision of ICOs projects can also set some soft conditions to improve the success rate of projects.

5.Recommendation

5.1 The choice of regulatory model

When discussing the regulatory issues of Green ICOs, the first thing to consider is the choice of regulatory models. The fundamental question for Green ICO regulation is the degree of government intervention in ICO regulation. Therefore, when regulating Green ICOs, how much the government should intervene and how much autonomy the industry should have been issues that should be considered in the regulatory model. For the regulation of Green ICO, it is necessary to ensure the authenticity, accuracy and timeliness of information disclosure otherwise the market failure and Greenwashing problem will still exist. Therefore, the supervision of financial institutions needs to intervene in some of the main problems of Green ICOs like market failure, information asymmetry and Greenwashing, but at the same time leave some room for self-regulation in the Green ICO industry.

In fact, some degree of self-regulation is beneficial both for Green ICOs and for the ICO industry as a whole. As analyzed above, Green ICOs have information asymmetry issue and require certain knowledge reserves for regulators and investors. It is believed that if one industry is suitable for self-regulation, it must meet the following three conditions: first, the industry is

afflicted by some form of market failure, especially externalities or information asymmetries; second, current private law or regulation instruments are inadequate or too costly to correct the market failure; third, self-regulation is a better or cheaper approach to solve the problem than traditional public regulation.⁴³⁵ As discussed in Chapter 3 ICO risks, both ICOs and Green ICOs have a certain degree of information asymmetry, and Green ICOs are prone to market failure for some reasons. If the Green ICO is regulated like IPO, it will not only increase the cost, but also deviate from the original purpose of ICO.

As it has been discussed in the previous chapters, current regulation on Green ICO is not adequate to overcome the problems like information asymmetric and greenwashing. At the same time, the cryptocurrency sector is rapidly evolving, and rules and regulations need to keep pace with the changes. Self-Regulation Organization (SRO) can adapt and modify its rules more quickly than a governmental regulatory body. Also, by self-regulating, the Green ICO industry can alleviate the necessity for government intervention. This could lead to more efficient and suitable regulations, as those involved in the industry would have a more nuanced understanding of the unique risks and challenges it faces. This can reduce the regulatory burden of Green ICO.

Also, relying only on traditional government regulation can easily lead to information asymmetry and insufficient knowledge of the industry.⁴³⁶ For reason that traditional regulatory approach is more rigid and cannot deal with the risks brought by new financial products. The global financial crisis in 2008 made people realize that the financial markets of various countries or regions around the world are not independent, but integrated.⁴³⁷ In the wake of the 2008 financial crisis, it was also recognized that traditional regulatory approaches seemed unable to cope with the more interconnected financial markets. In the case of Green ICOs, the source of funds may be investors from all over the world, so its risk in one region is likely to spread to other countries or regions. SRO (self-regulation organization) is believed to play an effective role in cross-border transactions, and it also have a role in identifying and monitoring systemic

⁴³⁵ Anthony Ogus, 'Rethinking self-regulation' (1995) 15 Oxford J Legal Stud 97

⁴³⁶ The main criticism about the top-down regulatory model is that this model has insufficient knowledge to identify the causes of problems, to design solutions that are appropriated, and to identify non-compliance (information failure). Also, this model also cannot to design appropriately sophisticated and effective legal and policy instruments to address complex social problems (instrument failure), inadequate implementation of the regulations (implementation failure), and failure to motivate the regulated entities and individuals to comply with the rules (motivational failure). See at Omarova, 'Rethinking the future of self-regulation in the financial industry'

⁴³⁷ CFA, 'Self-regulation in the securities markets transitions and new possibilities', CFA Institute, (2013)

risk.⁴³⁸ An SRO composed of industry insiders has in-depth knowledge about the intricacies of ICOs, blockchain technology, and cryptocurrency. Therefore, they are well-suited to create nuanced regulations that are effective and balanced.

Self-regulation can complement the traditional way of regulation. That is because the self-regulation is more flexible, and context driven. The participants in the regulated market can respond faster and better to the changes in market conditions without financial intermediary.⁴³⁹ As a result, self-regulation is considered to be inherently more efficient, less costly, and less complex than government regulation. More meaningfully, self-regulation advocates emphasize its potential for cultivating shared values between private actors, cultivating their sense of ownership and participation in the rule-making processes reflecting those values as well as facilitating voluntary compliance with the resulting rules.

For setting the SRO in the financial market, four aspects must be checked under the principle of rule of law: first, the source of authority which means the SRO are recognized by statute or receive authority through official recognition channels, such as statutory regulatory. According to the principle of the rule of law, this provides the legal basis for the existence and operation of SRO. Second, extent of authority. The SRO can be the frontline regulator and it can operate independently with authority to create and enforce the rules. But it still needs to albeit with prior review from its primary regulator. Third, the breadth of mandate, which covers not only about rule making, but also limited authority to discipline members for infraction like holding hearing, or barring members from the industry. Fourth, the source of funding. The relationship between the funder and SRO must be handled appropriately, since the two parties might have obvious conflicts of interest. Also, an SRO's enforcement approach may be affected, consciously or unconsciously, if it considers sanctioning or investigating a large member or investigation whose representatives sit on its governing board. These four aspects must be carefully considered when the financial industry operates a self-regulatory model.

For the Green ICO case, there is no strictly standard SRO yet. But SRO can still be expected to reduce the possibility of market failure and increase the transparency of Green ICO projects. In

⁴³⁸ Ibid.

⁴³⁹ Ibid. (n 169)

this way, information communication between the ICO industry and regulators will be more efficient and transparent. Even if the regulators lack certain knowledge, they can communicate with the SRO to keep abreast of the development of the market. At the same time, the government's supervision still has to put forward certain mandatory requirements for Green ICO projects, such as the information disclosure of the white paper discussed next, the mandatory filing of Green ICO projects, and so on.

5.2 Regulatory direction and choices

Since the discussion is mainly focus on UK, and UK is still within EU jurisdiction. The "Markets in Financial Instruments Directive" (MiFID) could be considered. It is an EU regulation introduced to harmonize retail and institutional investors' protection and increase the efficiency and resilience of financial markets. Initially introduced in 2004 (MiFID I), it underwent significant revisions and an updated version, known as MiFID II, took effect from January 3, 2018, alongside the Markets in Financial Instruments Regulation (MiFIR). In the ICO cases, MiFID could provide some direction in classification of tokens, investors protection, transparency and reporting. One of the primary regulatory challenges concerning ICOs is how to classify the tokens they issue. If a token issued during an ICO is classified as a "financial instrument" under MiFID II, then the ICO could potentially fall under the directive's scope.⁴⁴⁰ This means that the entity issuing the ICO would need to comply with MiFID II regulations, which could include obtaining certain licenses and adhering to various organizational and conduct requirements. MiFID II also emphasizes the protection of investors. If ICOs fall under MiFID II, then issuers would have to adhere to strict disclosure requirements and provide adequate information, ensuring that potential investors are well-informed and protected against misleading practices. MiFID II introduces more rigorous transparency and reporting requirements for financial transactions. If ICOs are within its scope, this could mean increased transparency in token sales, offering more clarity to potential investors and regulators. To be specific, it can offer Pre-trade and Post-trade transparency. This refers to the disclosure of trading interests before trades are executed. Under MiFID II, trading venues such as exchanges, Multilateral Trading Facilities (MTFs), and Organised Trading Facilities (OTFs) must make

⁴⁴⁰ Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU, 2014 OJ L.

current bid and offer prices, as well as the depth of trading interests, available to the public.⁴⁴¹ For the Post-trade transparency, this involves the disclosure of details of transactions after they've been completed. Again, venues like exchanges, MTFs, and OTFs have to publish the price, volume, and time of trades in financial instruments. This disclosure needs to happen as close to real-time as possible.

However, currently MiFID II primarily concerns the regulation of traditional financial instruments and services within the European Union. There are many challenges if trying to apply it in the ICO regulation. The first is the definitional issues. The primary challenge is defining whether tokens issued during ICOs qualify as "financial instruments" under MiFID II. Cryptocurrencies and tokens have diverse characteristics – some may resemble securities, while others function more like commodities or utility tokens. Establishing a one-size-fits-all definition is challenging. Second, there are some jurisdictional issues: ICOs often have a global reach, with contributors from various countries. Enforcing MiFID II rules on projects based outside the EU or targeting participants from non-EU countries could be complex. Third, the ICO has rapid evolution in the past years. The cryptocurrency space is rapidly evolving, and regulations that are too strict might stifle innovation. Applying a traditional regulatory framework to an emerging domain might not capture all nuances of the new technology. Fourth, differing member state interpretations, although this thesis mainly focus on UK, the ICO projects and funding could come from all over the EU. MiFID II provides a framework, but individual EU member states can interpret and apply the directive differently. This could lead to inconsistencies in how ICOs are regulated across the EU. Therefore, while MiFID II provides a robust framework for traditional financial instruments and services, its direct application to the realm of ICOs comes with challenges. A more effective approach might involve developing new regulatory guidelines tailored specifically to the unique characteristics and challenges of cryptocurrencies and token sales while borrowing key principles from established regulations like MiFID II.

In the Green ICO case, although Green ICO adopts new financing technology to help Green Finance raise funds, it still belongs to financial products. Financial products are a contract or package of contracts that are offered by a financial institution as part of business activities that

⁴⁴¹ Ibid

allow the other party to satisfy financing need.⁴⁴² The behaviour of investors investing funds to participate in the Green ICO and obtaining tokens and certain rights or benefits is actually the process of purchasing financial products. Therefore, the regulatory recommendations for Green ICOs can be analyzed in accordance with the theory of financial product regulation, and the goal is to minimize the possibility of market failure and Greenwashing. Both of these problems are caused by information asymmetry, so the primary issue of supervision should be to solve the information asymmetry in Green ICOs. Also, the issue of Greenwashing can be solved from the level of corporate behavior supervision.

There is still a certain difference between Green ICO and traditional financial products. For example, the higher the degree of asymmetry in professional knowledge between the two parties, the more likely it is that the product will be provided on a standardized basis. However, Green ICOs are still not highly standardized. There is no uniform standard on the whitepaper, contract terms and even no uniform standard for green projects. A standard for Green ICO whitepapers could enforce necessary disclosure requirements to ensure transparency, such as project roadmap, use of funds, token distribution, and technical aspects of the project. Without this, there might be a lack of transparency which could lead to distrust and uncertainty among investors. Without set standards, some whitepapers may not provide comprehensive information about the green project. Key aspects such as project feasibility, token allocation, team background, or risk factors may be omitted or insufficiently addressed. Thus, if regulators want to incorporate Green ICOs into regulation, the first thing is to standardize Green ICO.

Standardizing ICO whitepapers would mean implementing a consistent format, structure, and set of required information across all whitepapers. This could provide numerous benefits to regulators, investors, and project teams. For example, standardization ensures all projects provide a baseline amount of information, making it easier for potential investors to make informed decisions; regulators can more efficiently review and approve/disapprove ICOs if there's a standard format, which aids in quicker decision-making; A consistent requirement for details, especially around team members and legal aspects, can help reduce the chances of fraudulent projects; potential investors will know where to find specific details in every whitepaper, enhancing their ability to compare and analyze different ICOs. In fact, standardizing

⁴⁴² Ibid

ICO whitepapers can bring order and clarity to what has often been a chaotic and rapidly-evolving space. It would provide regulators with better tools for oversight and investors with more consistent information for decision-making.

At the same time, in order to prevent the problem of market failure, according to the supervision theory of financial products, attention should be paid to the information provided, the terms of the contract, and the firm's behaviour. In the context of Green ICO, since ICO intelligent contracts are still an early stage, they may not fully conform to the requirements of existing contract law in form. There is no requirement for a specific form of the contract. For Green ICO contract, the contract must reach the level of legal certainty that meets the risks tolerance of the contracting parties. Therefore, from the perspective of the current status of Green ICOs, the direction of supervision can focus on information provision and company performance.

In order to solve the problem of a large amount of information asymmetry and lack of information disclosure arising from the Green ICOs, the source of the problem should first be found. As it has been discussed in the chapter three section 2, one of the reasons for ICOs information asymmetry is due to the fact that there is no standard and mandatory regulation for information disclosure of green companies, which leads to investors who know little about the information and specific processes of green projects even the usage of the funds. In most cases, communicating with investors through social media, investors are in a passive position in the exchange of information. In the Green Finance case, the root cause of the Greenwashing problem is also the low level of corporate information disclosure and the lack of sufficient regulation for Greenwashing behaviors and also the information asymmetry about the environmental impact of the project that is seeking funds.

Related to the information provision behavior in the Green ICO is the whitepaper from the issuers. The standardization of the white paper is one of the main objectives of Green ICO regulation, as it has been discussed in the chapter five, the white paper of a Green ICO is one of the main sources of risk for its information asymmetry. Traditionally, regulation of manufacturers' dealing with consumers has focused on the provision of information intended to

enable consumers to make better decisions.⁴⁴³ However, information disclosure alone is not sufficient enough to improve consumers' financial decision-making since the information is often simply ignored or not taken into account.⁴⁴⁴ The idea of mandatory information disclosure might not be an effective choice to protect investors or consumers. Its effectiveness is determined by different types of investors or consumers. The examples for this approach are to mandate the disclosure of relevant information in relation to transactions or to subsidize the provision of financial education for consumers generally.⁴⁴⁵ If it is only for investors who do not know the consequences of their decisions, this might be useful to help them make wiser choices. However, information disclosure will do little to change the behaviour of investors who are driven by biases or instantaneous gratification. These investors understand the subsequent costs associated with their decisions and their assessment of the utility consequences of disclosure and education.⁴⁴⁶ Especially, investors who have the highest propensity of instantaneous gratification are like to benefit the least from education or disclosure of information provided since they will be least capable of investing the necessary time.⁴⁴⁷ Therefore, regarding the information disclosure of the company's whitepaper, the supervision method is necessary but not sufficient and need to be combined with other approaches like firm conduct regulation.

The firm conduct regulation focus on the behaviour of the financial firm rather than the content of information disclosed to the investors. Traditionally, the conduct regulation means the supervision of activities of the financial firm in relation to its consumers. 'Conduct' refers to the sales and marketing process, including advertising and marketing literature, sales communications, pre-contractual information, advice and recommendations and so on. In the Green ICO case, companies in Green ICOs projects should be incorporated into the existing system of corporate responsibility and Greenwashing supervision. Only by supervising the behaviour of Green ICO companies, such as marketing, sales, and communication with investors,

⁴⁴³ In the financial product regulation, manufacturers refer to the financial firms that offer standardized products. The term is not inapt to describe the firm that captures economies of scale in contract design by offering the same terms to a large number of customers.

⁴⁴⁴ Ibid

⁴⁴⁵ The financial education mainly refers to acquire the knowledge about financial planning, careers, budgeting, saving and investments, credit and insurance.

⁴⁴⁶ Omri Ben-Shahar and Carl E Schneider, 'The failure of mandated disclosure' (2017) *Актуальные проблемы экономики и права*

⁴⁴⁷ Adele Atkinson, *Evidence of impact: an overview of financial education evaluations* (2008)

and keeping the behaviour of green companies in compliance, can investors reduce their concerns about the Greenwashing of projects. In the UK, in order to avoid the Greenwashing issues, the issuers could take the Green Claim Code whose goal is to help green companies' claim genuinely green as a start point. Although as it has been discussed the current Green Claim Code is not compulsory but the code can provide a basic framework for companies to check their green claims are green or not.

What Green ICO currently needs to be improved and promoted is a series of negative effects caused by asymmetric information. The issue of Greenwashing, an imperfectly competitive market, and consumers' irrational investment choices are issues that regulators need to consider and solve. Based on the previous discussion that ICO may lead to market failures, the direction of supervision should consider from two aspects. For investor protection, the information asymmetry between investors and Green ICO issuers should be reduced so that investors can have more accurate and effective information about Green ICO projects. In this way, investors can make choices more rationally rather than being more inclined to follow the public. From the perspective of regulatory companies, it is necessary to disclose certain information to the public so as to prevent green companies from Greenwashing or defrauding investors.

Also, high-tech industry like ICOs and Green Finance has potentially increased the cost of learning for financial investment and education. If there is no proper method to break the knowledge barriers, it will still be unable to attract more funds from the private sector. High learning costs and high-risk market failures will discourage private investors. Therefore, there is an urgent need for a link bridge in this field that can express the complex and professional technical knowledge of Green ICO projects in another way that can be accepted and understood by the public or provide ordinary investors with a more objective and intuitive assessment of the project's risk result.

In addition, it is worth noting that this is the case where ICO is applied to Green Finance, so the measures below are weaker than national-level supervision. This is what has been discussed before, and the supervision of the combination of ICO and ICO in other fields still needs to reach an appropriate level to maintain the balance between technological innovation and regulation.

5.3 Setting standards for white papers and green projects

White paper, as the primary method of information disclosure for ICO projects, the role is significant for the success of ICO projects. Also, the white paper also plays a vital role in the information disclosure of Green ICO. A high-quality whitepaper can not only provide investors with detailed information about the project, technical information, and the qualifications of the creative team but also increase the credibility of the project, thereby attracting more investors.⁴⁴⁸ There is currently no unified standard for the content of the white papers, and the issuers can decide the content of the whitepaper. This will lead to insufficient information disclosure. As discussed in the previous section, although mandatory information disclosure has limited effects in solving the problem of information asymmetry, it is still effective for those investors who will make rational decisions if they fully understand the information. Therefore, regulators such as FCA should make certain mandatory information disclosures for Green ICOs and require them to be responsible for the authenticity of the information. Possible information should include but is not limited to: team information, project working mechanism or principle, ICO financing process, total financing to be achieved, financing time, risk factors, regulation and compliance, and providing channels for tracking the progress of green projects. The information can either increase the authenticity of the project, or prove the professional ability of the project team to investors, or prove the feasibility of the project. This can greatly reduce the risk of information asymmetry, thereby avoiding fraud or greenwashing of green projects.

At the same time, the legislation should protect consumers' trust interests in the content of the white paper. This can make the company pay more attention to the authenticity of the information disclosed in the white paper. Also, regulators should require all Green ICO issuers to file their white papers so as to prevent issuers from unilaterally modifying the white paper information and causing investors to fall into misunderstandings. The ICOs market relies on the credibility of white paper disclosures. Therefore, the improvement of the white paper should be the primary task for the promotion of Green ICOs.

Also, the unified identification standards for green projects should be introduced as soon as possible. Green ICO funds may come from all corners of the world, and unified standards help

⁴⁴⁸ Ryan Amsden and Denis Schweizer, 'Are Blockchain Crowdsales the New Gold Rush? Success Determinants of Initial Coin Offerings' (2018) Success determinants of initial coin offerings (April 16, 2018)

investors who are willing to invest in green projects to make accurate choices. Many projects in the Green ICO involve many blockchain projects, such as the carbon emissions trading system. They may be different from traditional green projects, so new classifications may need to be created.

(1) Information disclosure about technology

As mentioned in the previous discussion on the issue of information disclosure, information disclosure on technology does not benefit all investors. The disclosure of technical details is more to give those so-called geeks the opportunity to check the feasibility of the project. At present, ICO investors still exist in the form of community groups, among which tech-savvy geeks have a very high reputation, and their judgment on the project may affect the judgment of other investors. In addition, the disclosure of technical information details can also effectively prevent the emergence of purely fraudulent green projects because the disclosure of technical details will increase the cost of fraud. Finally, the disclosure of technology or patents can reduce the occurrence of Greenwashing. That is because when some specific details of the project are disclosed, investors can more clearly understand the mechanisms of operation of the green project. Of course, the premise is still based on the situation that investors are willing to understand. Some of the technologies details could include: blockchain and consensus mechanism, security measures, tokenomics and code review. "Tokenomics" is a portmanteau of "token" and "economics." It refers to the study and design of the economic systems that can be created using tokens, particularly in the context of cryptocurrencies and blockchain projects. Tokenomics encompasses various aspects of a token, such as its utility within a system, its distribution, its value determination, and its role in incentivizing behaviors among stakeholders.⁴⁴⁹ The whitepaper should clearly describe the underlying blockchain technology. If the project uses an existing blockchain (like Ethereum or Binance Smart Chain), this should be stated. If a new blockchain is being developed, the whitepaper should explain the specifics. The consensus mechanism (Proof of Work and Proof of Stake.) should also be specified and justified. Also, the project should detail the security protocols and measures it has in place to

⁴⁴⁹ Lin William Cong, Ye Li and Neng Wang, 'Tokenomics: Dynamic adoption and valuation' (2021) 34 The Review of Financial Studies 1105

protect against hacking and other cyber threats. This could include encryption methods, wallet security, multi-sig procedures, and more. The whitepaper should cover how are tokens created, distributed, and destroyed. The token should serve a clear purpose within the ecosystem. Also, the economic model (inflationary, deflationary) should be thoroughly explained. In addition, if the project is open source, it means its code is publicly accessible for review, adding transparency and the possibility for potential investors to verify its claims. Some projects may also choose to have their code audited by a reputable third party.

The technical capability of an enterprise is very important to the success of its project. For high-tech industries such as Green Finance and ICOs, the stronger their technological capabilities, the more likely they are to attract more investors, and they are more inclined to succeed. That is because, for ordinary investors or consumers, the technological capabilities behind the company are one of the essential indicators considered when investing in the technology industry. For investors, they prefer to invest in high-quality ventures since they are more likely to succeed.⁴⁵⁰ That is because if the issuers can show they have a better technological capability, the investors are more willing to believe their projects will succeed. Specifically, the technical indicators required by ICOs and Green Finance are, firstly, technical information from ICO, and secondly, technical information for green projects, which is usually expressed as patents. While potential investors may not be able to understand all the technical details in the Green ICOs whitepaper, it is reasonable to assume that potential investors in ICOs use the portrayal of technology in the white paper to make inferences about the venture's technical proficiency.⁴⁵¹ Moreover, a technical Green ICOs whitepaper can be a signal of a project's underlying technological capabilities.

The technical information could include the projects' blockchain and contracts, token issuance cycles, token function, token distribution, green business model, and the usage of funds. These are the basic information that investors want to see in a Green ICOs project. Because this information could matter the success of the projects. For example, knowing when and how tokens will be issued can affect the token's supply and, by extension, its potential value. It also provides transparency on any future issuance that may dilute the token's value. Also, since the

⁴⁵⁰ Gerrit KC Ahlers and others, 'Signaling in equity crowdfunding' (2015) 39 *Entrepreneurship theory and practice* 955

⁴⁵¹ Fisch, 'Initial coin offerings (ICOs) to finance new ventures'

ICO is themed around environmental or green projects, investors will want to understand the actual business model. This provides clarity on how the project contributes to sustainability, its scalability, potential revenue streams, and overall viability. Moreover, the usage of funds is important. Transparently communicating how the raised funds will be used is paramount. Investors want to know that their money is being directed towards actual project development, marketing, research, and other relevant endeavors, rather than unjustified overheads or, worse, being misappropriated. If investors can know this information in advance, it can greatly increase their confidence and make them more willing to invest.

Hence, token issuers should carefully check whether these contents are covered before writing the project white paper. In the current top ten energy-saving tokens, only four of them have the specific introduction of their tokens and technologies behind it; and half of them don't tell investors the usage of the tokens.⁴⁵² Therefore, for the Green ICOs whitepaper, standards should be established to require the disclosure of detailed technical information, and investors should be informed of the use and proportion of funds. Otherwise, it will not be able to attract more investors' trust in the project, nor will it increase investor confidence.

The other indicator that can represent the technical strength of ICOs is patent. It is still controversy about the patent effect of ICO projects. Although some people may think that the disclosure of patents can reduce the possibility of information asymmetry, it is difficult for ordinary investors to judge the technical standards of patents, which may not help investors make rational decisions. investment options. At this stage, patents cannot constitute a highly relevant and effective signal like technical information.⁴⁵³ One of the possible explanations is that patents have limited usability for DLT and blockchain ventures because code and software are not generally patentable in various jurisdictions.⁴⁵⁴ In these jurisdictions, only supporting technologies or specialized elements of code can be patentable. The founders need to make the code public on Github, but if the technological invention is disclosed already, it cannot be patentable either.⁴⁵⁵ Another explanation is that most of the ICO startups are in the early stages

⁴⁵² According to the CoinMarketCap, the current top 10 energy saving coins are: Energy Web Token, Power Ledger, EFFORCE, Restart Energy MWAT, Grid+, Energo, SunContract, Electrify.Asia, Pylon Network and Teslafan.

⁴⁵³ Ibid (n 104)

⁴⁵⁴EPO, 'Patents for Software? European Law and Practice.' < <https://www.epo.org/news-issues/issues/software.html>> accessed June 16th, 2021.

⁴⁵⁵ Ibid (n 104)

that they may not have technology advanced enough to apply for a patent yet. Also, blockchain patents are often filed by large, established companies, such as Bank of America or IBM.⁴⁵⁶ While the investors who pay attention to ICOs projects may not be that familiar with patents. However, some of the Green Finance projects in China and the U.K. current are dominated by large enterprises and even state-owned enterprises. Therefore, when ICO and Green Finance projects are further integrated, more patents may appear in the white paper.

(2) The proposed standardization of whitepapers form

In order to reduce the risk of information asymmetric the standardization of the whitepaper is necessary. This can force the issuer to disclose information related to the project to a certain extent. After summarized some of the whitepapers from the Ethereum, the standard ICO whitepaper could include these sections.

No	Sections	Content
1	Project overview	A brief introduction to the project, including its objectives, target market, and value proposition
2	Problem and solution	Clearly define the problem the project aims to solve and how the proposed solution addresses this problem
3	Token Utility	Explain the role and utility of the token within the ecosystem, including its use cases, benefits, and how it drives value for token holder
4	Technical details	Provide a thorough explanation of the technology and architecture behind the project, including the blockchain platform used, consensus mechanism, and any unique technical features

⁴⁵⁶ O'Neal Stephen, 'Is Blockchain About to Become a Patent War Battleground?' 2018 <https://cointelegraph.com/news/is-blockchain-about-to-become-a-patent-war-battleground> accessed June 20th 2021

5	Roadmap	Outline the project's development timeline, including key milestones and their expected completion dates
6	Team and advisors	Introduce the team members and advisors, including their backgrounds, expertise, and roles within the project
7	Legal and regulatory compliance	Detail the legal structure of the project, its jurisdiction, and any regulatory compliance measures taken, such as KYC/AML procedures
8	Tokenomics	Provide information on the token distribution, including the total supply, allocation for various purposes (e.g., development, marketing, team, advisors), and vesting schedules
9	Token sale details	Explain the terms of the token sale, such as dates, pricing, accepted currencies, minimum and maximum investment amounts, and any bonuses or discounts
10	Risk factors	Disclose potential risks associated with the project, including market, regulatory, technological, and operational risks, as well as any measures taken to mitigate them
11	Governance and decision-making	Describe the project's governance structure and how decisions are made within the ecosystem
12	Business model and revenue streams	Outline the project's business model and various revenue streams, explaining how the project aims to achieve sustainability and growth

13	Partnerships and collaborations	Mention any strategic partnerships, collaborations, or affiliations that contribute to the project's success
14	Security and data protection	Explain the measures taken to ensure the security of the platform and the protection of users' data
15	Community engagement	Detail the project's plans for community building, marketing, and communication with potential investors and users

Table 2 The suggested content for standardized whitepaper

In this form, some of the content if can be disclosed, the risk of information asymmetric could be reduced. For example, the information of the team can show the investors the resume of the issuers which can increase the confidence of the investors. The Tokenomics and token sale detail can provide investors with a specific issuance plan for project tokens also adds to the authenticity of the project. Also, the business model and revenue streams allow investors to have a more thorough understanding of how green projects operate and their business models. The community engagement also contributes to reduce the information asymmetric. The issuers and investors can have more communication in in the community and issuer can update the latest progress of the project. The disclosure of information above can greatly reduce the risk of project fraud or greenwashing.

By incorporating these elements into a standardized whitepaper template, ICO projects can provide a consistent and comprehensive source of information for investors, making it easier for them to evaluate the project and make informed decisions. It is important to note that these sections are not prescriptive but rather serve as a guideline for creating a comprehensive and informative whitepaper. The actual requirements and preferences for whitepaper content may vary depending on industry, and individual project. Therefore, it is essential to tailor the whitepaper to the specific needs of the project and its target audience, while also considering the legal and regulatory landscape in the region where the ICO is being conducted.

In the case of Green ICOs, there are some sections that can be added or modified to make the whitepaper more suitable. For green project, there should be Environmental impact and sustainability which can clearly explain the project's environmental goals; Green project details which can provide a comprehensive description of the green project(s) that the ICO aims to fund, including their objectives, implementation strategies, and potential benefits for the environment, society, and the economy; Environmental performance monitoring which can outline the methods and metrics used to monitor and report on the environmental performance of the projects funded through the ICO, ensuring accountability and progress towards sustainability goals; Environmental, Social, and Governance (ESG) integration which will explain how the project integrates ESG factors into its operations, decision-making, and risk management process; Green standards and certifications that mention any green standards, certifications, or best practices that the project adheres to, such as BREEAM (Building Research Establishment Environmental Assessment Method) , or the Green Bond Principles.⁴⁵⁷ By incorporating these additional elements into the standardized whitepaper template for Green ICOs, the whitepaper will provide investors with a comprehensive understanding of the project's environmental objectives, strategies, and expected impact. The enforcement is also worth consideration. In view of the particularity of green projects, the supervision of Green ICO white papers can actually require green companies to disclose some information by force. In view of the fact that some ICO green projects may be specific companies in reality, they may have been regulated by the FCA. However, there are still some companies whose business may be engaged in virtual online green projects, which may require FCA to limit the scope of their business when applying for company registration in the UK.

5.4 Establish a third-party dynamic rating mechanism

For investors who do not know enough about ICO and Green Finance, it may be difficult to understand the technical terms and business models of ICO and Green Finance in a short time. For those investors who do not understand, if they are still interested in getting involved in the Green Finance industry and making contributions to environmental protection or sustainable development industries, they need to find ways to lower the threshold and information

⁴⁵⁷ BREEAM (Building Research Establishment Environmental Assessment Method): BREEAM is an international green building certification system developed by the Building Research Establishment (BRE) in the United Kingdom. It is one of the world's oldest and most widely used green building assessment methods.

asymmetry. Otherwise, green companies can unscrupulously mislead investors or hide key information during ICO, while ordinary investors have no discernment ability. If this is the case, the risk of Green ICOs will increase, and the advantages of the combination of ICO and Green Finance will not be able to be effectively utilized. Therefore, a third party might be a good way to lower the investment risk and reduce information asymmetry.

The purposed rating mechanism is a market solution rather than law or regulation. The possible reasons are as follows: first, a third-party rating system can be more adaptable to the rapid pace of technological changes in the blockchain and ICO space. They can quickly modify their rating criteria and processes without the bureaucratic constraints that regulatory bodies often face. While regulators might have certain political or policy-driven priorities, a third-party can position itself as a neutral entity, focusing purely on the objective assessment of the Green ICOs. Also, third parties can build a team of experts dedicated solely to understanding, analyzing, and rating Green ICOs. Regulators, on the other hand, have multiple areas to oversee, which might dilute their focus and expertise on this specific niche. Moreover, a third-party rating agency can closely align its services with the specific needs and concerns of investors. They can offer additional services, such as detailed reports, insights, and analyses, which might be beyond the purview of a regulatory body. Since the purpose of green ICOs is to attract investment from private investors, a scoring system that is more investor-focused may also be more attractive to investors.

There is currently an ICO rating system, but there are certain defects and a lack of professionalism. For example, the ICO bench, which is the biggest online ICO rating website. Their rating system is a social one, as anyone can apply to their website to become an ICO expert. Thus, the quality and consistency of expert's evaluations may vary depending on the preferences and their bias. Other rating websites like Top ICO List and ICO rating, there are relatively few currencies included, and none of the energy-saving currencies mentioned above has their relevant ratings. Therefore, it is necessary to establish a more professional rating system that has a higher coverage rate and understands the expertise of different industries. If these systems can be run by an organization with a certain degree of authority, then the credit will be significantly increased. Moreover, this rating system should be dynamic rather than static. Like most current rating websites, they only rate the status of ICO projects at the current stage.

The problem of Greenwashing of Green ICO projects can be solved in a dynamic rating system because the dynamic rating system will update the rating in time when the project has made certain Greenwashing behaviors, to prevent more investors from still being misled by the green project and can greatly reduce the investment risk.

In order to make the rating system more reliable to the investors. The information provide should be updated in time. The information could be: team evaluation (whether they have a track record of success in blockchain technology, business); whitepaper analysis (explain the projects in an understandable manner); technical solution and innovation (evaluate the project's technology and its innovation level); legal and regulatory compliance (check whether the project is compliant with relevant laws and regulation); roadmap and progress (update whether the issuers meet its milestones). The rating system should be transparent and easy to understand. Using a numeric or star rating system could help, or could use different categories for different aspects of the ICO. It would be best if it also kept rating system dynamic, adjusting ratings as new information comes to light.

But it is still difficult to construct such a neutral rating agency or website. First of all, if you want to self-regulate ICO, you have to exclude some official intervention. And privately constructed scoring systems may involve interest issues. For example, defrauding investors' trust by exchanging interests with the issuer of the project. Therefore, the neutrality of this kind of organization is a relatively big difficulty. At present, some similar websites have adopted a system of charging membership fees from investors to ensure their own operations so that they will not be coerced by the interests of ICO issuers. But whether it has truly maintained objective neutrality is still a question that investors cannot know.

5.5 Provide more legislation suitable for Green ICO

As discussed before, when a specific field is combined with ICO, supervision falls more on the ICO rather than the specific field. The existing regulatory system on Green Finance does not include Green ICOs. Thus, when Green ICOs present risks, such as Greenwashing, there will be many regulatory gaps. Specifically, this chapter has the following suggestions: first, the regulatory logic should be changed, not only focusing on the supervision of ICOs but making corresponding adjustments based on the application of ICOs in different fields. For example, at

present, some regulations on Greenwashing are not well applicable to Green ICO. Many rules cannot be mechanically applied, but appropriate changes or more explanations should be made. Most of these regulations stipulate some physical green projects, and a considerable part of Green ICOs are virtual green businesses such as carbon emission trading systems and electricity trading systems. For a Green ICO, many products and services are virtual. The detailed classifications stipulated in the Green Claim Code are all green products for entities, which also leaves a gap for the greenwashing of those non-entity projects in green ICOs. Also, the existing regulations are difficult to directly apply to these projects. When the existing regulations can be well adapted to the combination of Green Finance and ICO, the risk of Greenwashing may also be reduced.

Although the British government currently proposes a series of regulatory guidelines to prevent green laundering. But as discussed in Chapter 5, such as the Green Claim Code, its problem is that it has no mandatory force, but only serves as a guide. When green companies are faced with huge benefits, due to the lack of mandatory standards and the consequences of violating the law, green companies often choose to ignore non-mandatory standards. Such regulation cannot effectively solve the problem of greenwashing in the green market. Therefore, the best way to deal with the problem of green laundering is to turn the non-mandatory guidelines into mandatory regulations, and stipulate the consequences for companies that violate the law, such as restricting the company or the actual manager to engage in green washing for a certain number of years. green activity.

5.6 Establish well-defined and mandatory green regulation

As discussed earlier, in addition to increasing information disclosure, another regulatory perspective is to supervise corporate behaviour. This will include Green ICO project design, marketing, advertising, and other perspectives. Among them, the supervision of marketing and advertising may effectively reduce the occurrence of Greenwashing risks. For example, make some compulsory regulations rather guidelines from the advertising and marketing of Green ICO. Restrict some vocabulary and methods of Green ICO promotion, such as restricting the use of some proprietary vocabulary in advertising. As it has been discussed in chapter five, the Green Claim Code provide some behaviours that have the risk of green washing, but the

guidelines are too soft. Even if the company does not follow the Code, there is no serious punishment.

Besides, this puts forward requirements for the establishment of a unified green standard because there is still no uniform standard for Green Finance, so the vocabulary used in the promotion of Green ICO may be misleading. Investors will be attracted by Green ICO slogans or seemingly environmentally friendly words from white papers and official websites. A good example comes from China, where the State Administration of Market Regulation has established a green product and label certification information platform.⁴⁵⁸ This platform, provides certificate inquiries, as well as officially certified green standards and green product catalogues and related policies and regulations. This information platform officializes many green standards so that green products in China must comply with their standards when promoting them. If there is false or excessively exaggerated false propaganda, the corresponding regulatory agency will be held accountable. Such a platform can help reduce misleading information generated to consumers when green products are promoted. This effectively reduces the risk of Greenwashing from the company's publicity and marketing stages.

However, most of the current green standard platforms in China are physical green product standards such as green building materials. Green ICO projects are not included. Of course, the reason must be that ICOs have been banned in China (for more details about ICO ban in China, see at Chapter 6 section 3). But the platform also does not involve non-physical green projects. Therefore, a feasible suggestion is to establish an official green standard platform and add virtual projects to it. Issuers of Green ICOs will rate the grades or types of green projects in accordance with the standards, and at the same time, carefully apply the wording of the promotion to avoid misunderstandings among investors.

The fundamental contradiction of Greenwashing is that investors cannot understand the progress of green projects in a timely or clear manner. That is, investors cannot clearly understand what the green company is doing. Therefore, the regulation could require Green ICO companies to report project progress on a regular basis or to adopt technical means to enable investors to track the project in real-time.

⁴⁵⁸ See at <http://www.chinagreenproduct.cn/GPIA/front> accessed on 5th December 2021

Another feasible way of supervision is to establish a green credit rating system. It is different from the third part rating system and based on the green credit system. China is already setting up a green credit rating system within its territory, in which the credit ratings of all green companies will be recorded. Companies with poor credit will also be announced in the system. This system is to follow the credit investigation system of the People's Bank of China. People who have poor credit or default on loans from financial institutions will be publicized. Poor credit records will affect the individual's future bank loans. Banks will propose different levels of loan standards for customers based on the quality of their credit records.⁴⁵⁹ For some people with serious circumstances, their high consumption may be restricted, such as taking airplanes. The green credit information system can use this as a reference to publicize companies with Greenwashing history. Green companies that have repeatedly greenwashed can be warned or prohibited from engaging in related green industries. Recording and publicizing the behavior of green enterprises can make green enterprises act more cautiously.

Similarly, the British government can try to endorse some ICO projects and requires these Green ICO projects to make mandatory information disclosure. For example, the standard whitepaper as it has been suggested above, the details of the project, the business model. On the one hand, the endorsement by the British government can greatly increase the credibility of the project and attract more investors to participate. On the other hand, due to the mandatory disclosure of information, the situation of greenwashing can also be greatly reduced. As discussed before, the current green regulation in the UK lacks mandatory and punitive measures. The intervention of the British government or regulatory agencies can effectively solve this problem.

6. Summary

In general, the UK has adopted a relatively lenient regulatory stance on ICOs, not only clearly categorizing them but also integrating the regulation of Security Tokens with existing laws. Although the United Kingdom has provided many basis for green ICO from the regulatory point

⁴⁵⁹ China's real-name system has almost covered the whole country, so the credit of any citizen can be traced.

of view to prevent its greenwashing or information asymmetry risks. But it still lacks many rules to apply to ICO. In addition, because the guidance is suggestive, its coercive force is weak, and it may not fundamentally solve the greenwashing problem of green ICOs. The CP has not yet released the final version, and its effectiveness is still unknown.

This chapter mainly try to provide some recommendation for the regulation of Green ICOs based on the risks that mentioned in the chapter three. The information asymmetry is the root that might cause market failure and Greenwashing. Therefore, a standard whitepaper, a professional and unbiased rating system and more suitable and mandatory legal and regulatory rules for Green ICOs could be helpful to reduce these problems.

Chapter 6 The regulation of Green ICOs in China

The Green ICO regulation in China is different from the UK. Now, China has already ban the ICO and there is no room for Green ICO. In the early development of ICO, China lacked regulation, but later adopted a one-size-fits-all measure, which eventually completely banned ICO in China. The reason before the ban is still worth exploring. In fact, understanding the reasons for ban ICO in 2017 can provide valuable insight into the risks like market failure and greenwashing associated with this type of fundraising and the regulatory measures that might be required to mitigate those risks. Thus, this chapter will first introduce the regulatory history and body of ICO in China. Then, critical evaluate the reasons why China ban ICO in 2017 and the benefit and drawbacks of the ICO prohibition.

1. The financial regulatory architecture of China

1.1. Central regulatory body

In general, the China financial regulatory body is led by the central bank. The People's Bank of China established a FinTech Committee in 2017 to strengthen research planning and overall coordination in FinTech.⁴⁶⁰ The Central Bank also established a Chinese-style financial technology regulatory mechanism. As of November 2018, the Central Bank's Anti Money Laundering Monitoring and Analysis Center has signed 48 cooperation documents with foreign financial intelligence agencies to strengthen cooperation with other countries.⁴⁶¹ At the same time, like the Bank of England, the Central Bank uses the "regtech" to supervise the FinTech. For example, they use big data, cloud computing to improve the ability to identify, prevent, and resolve cross-industry and cross-regional financial risks.⁴⁶²

⁴⁶⁰ Yueshi Chen, 'The central bank establishes a financial technology committee: using artificial intelligence and cloud computing to enrich supervision method' (2017) PP <https://www.thepaper.cn/newsDetail_forward_1685413> accessed at 18th October 2020

⁴⁶¹ JuanJuan Niu, 'Anti-Money Laundering Monitoring and Analysis Center and Ecuador's Financial and Economic Analysis Team signed a memorandum of understanding on cooperation' (2017) CSSN <http://www.cssn.cn/jjx_gdxw/201709/t20170913_3639357.shtml?COLLCC=2663529733&> accessed at 18th October 2020

⁴⁶² Financial Conduct Authority (FCA), "Regtech," accessed May 3, 2023, <https://www.fca.org.uk/firms/innovation/regtech>.

In China, as it has been described in Chapter three section 2, the latest reform for the regulatory body is NFRA in 2023. In 2018, the “two Conferences” adopted the State Council’s institutional reform plan to integrate the responsibilities of the China Banking Regulatory Commission and the China Insurance Regulatory Commission.⁴⁶³ The financial supervision system of “one committee, one bank, and two commissions”.⁴⁶⁴ The CBIRC’s Information Technology Department developed an inspection analysis system (EAST) to improve the intensity and effectiveness of on-site inspections of banking financial institutions.⁴⁶⁵ The system includes functional modules for bank standardized data extraction, on-site inspection project management, data model generation tools, data model release, and management.⁴⁶⁶ The system could be using the big data (data of commercial bank related business system) to conduct violation FinTech business analysis. The newly implemented EAST system effectively supersedes its predecessor, addressing several inherent issues.⁴⁶⁷ These include resolving complications arising from diverse data structures across institutions, enhancing data modelling by facilitating the inheritance and utilization of existing models, and significantly improving inspection efficiency, especially for small to medium financial institutions.⁴⁶⁸ The new system develops a set of standard interface data specifications for financial institutions to unify the data of their respective business systems into this interface file. In this way, all the data from financial institutions can be regulated by the CBIRC. Then, there is a set of new data analysis system based on standard interface data specification, used for automatic supervision model analysis.

For the China Securities Regulatory Commission, the regulation on FinTech is still in the early stage, and it issued the “China Securities Regulatory Commission Supervision Technology

⁴⁶³ The National People’s Congress (NPC) of the People’s Republic of China and The Chinese People’s Political Consultative Conference (CPPCC). The NPC is the highest organ of state power. Its permanent body is the Standing Committee of the National People’s Congress of the People’s Republic of China. The NPC and its permanent body exercise state legislative power. The CPPCC is an important institution for multi-party cooperation and political consultation under the leadership of the Communist Party of China, and an important form of promoting socialist democracy in China’s political life. The three main function is political consultation, democratic supervision, political participation and discussion.

⁴⁶⁴ Financial Stability and Development Committee under the State Council, People’s Bank of China, and China Banking and Insurance Regulatory Commission and China Securities Regulatory Commission.

⁴⁶⁵ ICFC, ‘EAST’ (2018)

⁴⁶⁶ http://www.icfcc.com/icfcc/templet/web/articleView.jsp?class_id=3020&CLASS_ID=3036&ARTICLE_ID=2353 accessed at 20th October 2020

⁴⁶⁷ Ibid

⁴⁶⁸ Ibid.

Overall Construction Plan” in 2018. In the Plan, the CSRC clarified the needs and work content of various information construction work of Supervision Technology 1.0, 2.0, and 3.0.⁴⁶⁹ The work content of Supervision Technology 1.0 is mainly to purchase or develop mature and efficient software and hardware tools or facilities to meet the information needs of the basic office and specific tasks of the internal departments and dispatched institutions. It is aiming to improve the digitization, automation, and standardization of supervision work. The 2.0 is mainly focused on enriching and improve the functions of the central supervisory information platform, optimize the construction of business systems, and realize the full-process online operation of cross-departmental supervisory services. It will lay a good foundation for the 3.0 stage by using technologies like big data, cloud computing, and ai. The core work of the 3.0 stage is to build a highly efficient supervisory big data platform comprehensively using electronic early warning, statistical analysis, data mining, and other data analysis technologies to conduct real-time monitoring and historical analysis and investigation around the main production and business activities of the capital market.⁴⁷⁰ The system could help supervisors to conduct a panoramic analysis of market entities, monitor and monitor the overall market situation in real-time, detect suspected insider trading, market manipulation, and other illegal activities in a timely manner, perform supervisory duties, and maintain market transaction order.

1.2 Vertical regulatory relationship

Regarding the relationship between the central and local governments of financial technology supervision, the Central Bank, the China Securities Regulatory Commission CSRC and China Banking and Insurance Regulatory Commission (CBIRC) have dispatched agencies in various places.⁴⁷¹ While such dispatched agencies that extend vertically from the central government to all localities are also unable to perform their duties, as China is too vast, the number of

⁴⁶⁹ CSRC, ‘The China Securities Regulatory Commission officially released the overall construction plan for the implementation of regulatory technology’ (2018) <http://www.csrc.gov.cn/pub/newsite/zjhxwfb/xwdd/201808/t20180831_343433.html> accessed 21th October 2020

⁴⁷⁰ Ibid

⁴⁷¹ The CSRC is the main regulator of the securities industry in China. It oversees China’s securities supervisory system, regulate and supervise securities issuers. It also can impose penalties for illegal activities that relates to securities and futures. The CBIRC are authorized to supervise the establishment and ongoing operations of banking and insurance institutions and Enforce regulations when they are violated.

financial institutions directly under the central institutions is too large.⁴⁷² For example, both of the Central Bank and the CBIRC have three levels.⁴⁷³ Locally, the CSRC has only one level, namely, the securities regulatory bureaus of 31 provincial-level administrative regions and the securities regulatory bureaus of 5 cities with separate plans. It is hard for Central Bank, CSRC and CBIRC to manage and coordinate such a large number of intuitions at the same time.⁴⁷⁴ In this situation, the Fifth National Financial Work Conference was held in 2017, and it was determined that the central regulatory agency would uniformly formulate regulatory rules, local regulatory agencies would formulate specific rules and operating methods, and the financial officer would be upgraded to a local financial regulatory bureau. Its original comprehensive functions have also been transformed into supervision and management and risk management functions. This can reduce the regulatory workload of the central financial sector and delegate more work to local departments. China's financial supervision has been adopting a separate supervision model since the "Decision of the State Council on the Reform of the Financial System" promulgated by the State Council in 1993.⁴⁷⁵ Under this model, the Chinese government requires the insurance industry, securities industry, trust industry and banking industry to implement separate operations and supervision. As for the regulation of FinTech, it is still regulated according to different markets. For example, if FinTech has a crisis in the securities market, then the CSRC will manage and regulate the risk. However, local institutions still face the problem of insufficient professional staff to monitor financial risks.

As for industry self-regulation, the China Internet Finance Association was formally established in March 2016 in accordance with the "Guiding Opinions on Promoting the Healthy

⁴⁷² The central bank's dispatched intuitions are divided into three levels. The first level is 9 district-level branches and 2 operation and management departments, the second level is 330 central sub-branches, covering provincial capital cities, sub-provincial cities and general prefecture-level cities, and the third level is 1,778 country-level branches.

⁴⁷³ The first level is the banking and insurance regulatory bureaus of 31 provincial administrative regions and the banking and insurance regulatory bureaus of 5 separate cities. The second level is 306 prefectural and municipal banking and insurance regulatory bureaus, and the third level is offices, belonging to prefectures and cities. The internal institutions of the Banking and Insurance Regulatory Bureau shall not independently exercise supervision responsibilities externally.

⁴⁷⁴ Fubin Chen, 'Optimization of the allocation of central and local financial regulatory powers-with the perspective of local shadow banking supervision' (2020) XDFX p103

⁴⁷⁵ State Council of the People's Republic of China, 'Decision of the State Council on the Reform of the Financial System', 1993.

Development of Internet Finance.”⁴⁷⁶ The association is considered to be an important measure to build a financial regulatory mechanism that effectively coordinates industry self-discipline and industry supervision in the field of financial technology in China. It has strong data statistics and provides data statistics support for Internet financial supervision. Since 2016, the Association has formulated the “Internet Financial Statistics System” and has developed and launched an Internet financial statistic monitoring system.⁴⁷⁷ Then it strengthens risk monitoring and early warning to provide timely risk information for Internet financial supervision. Moreover, it accelerates a centralized registration disclosure platform to provide comprehensive verification information for supervision.

2. The Chinese characteristic regulatory approach “Yue Tan”

The term Yue Tan (yuē tán) is indeed a unique regulatory practice in China, usually referring to a form of informal discussion or meeting called by a regulatory authority. The purpose is typically to express concerns, issue warnings, or give advice to an organization or individual without enforcing formal regulatory measures. While the term does not have a direct equivalent in English, it could be translated in different ways based on the context. Phrases like "regulatory discussion," "informal regulatory meeting," "supervisory interview," or "regulatory talk" could be used to convey the meaning in an English-speaking context.

The Chinese government and regulatory agencies have used Yue Tan in the process of ICO supervision. For example, New York-listed Renren has called off plans for an ICO after talks with regulators. In fact, since the central bank announced in September 2017 that ICOs are illegal, the Chinese regulatory authorities have been paying close attention to the company’s movements and have taken interviews with some companies that may or have evaded laws and regulations.⁴⁷⁸ In addition, in order to continue to strengthen the clean-up and rectification starting from the payment and settlement side, Chinese regulators have repeatedly interviewed

⁴⁷⁶ PBOC, ‘Guidelines on Promoting the Healthy Development of Internet Finance’ (2015) <http://www.gov.cn/xinwen/2015-07/18/content_2899360.htm> accessed at December 22nd 2020

⁴⁷⁷ Yan Zhou, ‘Internet Finance Association Internet Finance Statistics Monitoring System is online’ (2017) FN <https://www.financialnews.com.cn/if/201708/t20170830_123675.html> accessed 22 October 2020

⁴⁷⁸ 36Kr, ‘ICO | People Informed: Renren Cancels ICO Plans After Interviews with Chinese Regulators’ <https://36kr.com/p/1722155778049> accessed 10 May 2023

non-bank payment institutions such as Tenpay and Alipay, requiring them to strictly implement the requirements not to conduct business related to virtual currencies such as Bitcoin.⁴⁷⁹ At present, Alipay has investigated and closed about 3,000 accounts engaged in virtual currency transactions.

Yue Tan is a supervision approach with Chinese characteristics, and its essence is an administrative method. The Yue Tan is also called “make inquiries.” The Interview originated from the taxation department of Hong Kong, China. When performing tax review duties, it will have an informal meeting and dialogues with taxpayers.⁴⁸⁰ Later, as an experience worth learning from in the field of tax administration, many academic papers in the field of tax theory introduced it to the mainland.⁴⁸¹ For the mainland, until 2002, the Local Taxation Bureau of Liaoning Province clearly stipulates the Interview group, Interview steps, and procedures, and it's content. Since then, the Interview has continued to expand its scope, including environmental protection, land and resources, education and science and technology, safety supervision, finance, and auditing.⁴⁸² Although the Interview system in financial area takes a more flexible solution to the regulatory problems, it still has many problems such as lack of legal basis, gradually becoming mandatory, and prone to abuse of power. Therefore, more restrictions should be attached to the application of financial technology supervision.

In general, there are four types of Interviews. The Pre-warning administrative Interview; Post-event supervisory, administrative Interview; Civil dispute mediation Interview; and administrative dispute settlement Interview.⁴⁸³ Among them, the Pre-warning administrative means the administrative agency informs the administrative counterpart of the relevant laws and regulations and the punishment results for violations of laws and regulations and helps the counterpart to analyze the consequences and harmfulness of the incident so as to avoid

⁴⁷⁹ CNTV, ‘The Central Bank Resolutely Cracks Down on ICOs and Various Variations’

<http://news.cctv.com/2018/07/06/ARTtEXkigpcfJH9BJboku19180706.shtml> accessed 10 May 2023

⁴⁸⁰ Qian Chen, ‘Exploration of the legalization Path of China’s administrative Make Inquiries system’, ECUPSL, (2016)

⁴⁸¹ In the Chinese mainland tradition, there are behaviors similar to Make Inquiries, such as ‘conveying the spirit of documents’, ‘individual talks by leaders.’ It provides political soil for Make Inquiries as a means of administrative supervision.

⁴⁸² *ibid*

⁴⁸³ *ibid*

unnecessary mistakes.⁴⁸⁴ It is often used in the market regulation, especially in the financial area, because the position of the administrative agency is more foreseeable than the administrative counterpart, and the implementation of Interview can help financial companies better foresee and avoid the risks of violations faced by their own operations.⁴⁸⁵ This kind of non-mandatory regulation is innovation and an attempt in China's financial market supervision.

3. ICO regulation in China

During the recent years of ICO development in China, there was no specific directional regulation. In many cases, the government's supervision of ICO is included in the supervision of FinTech, so the relevant regulatory agencies are also consistent. This section will introduce China's regulation from the perspective of regulatory history, regulatory agencies and special regulatory mechanisms-interview.

3.1 The ban on ICOs

The ICO supervision process in China precisely reflects that the chaotic ICO has caused many fake projects and tokens to flood the market, which seriously interferes with the development of ICO, and the Chinese government has to take the most stringent regulatory measures. As introduced in the previous chapter three, ICO and token are not the same, ICO is the way to generate token. The difference between Initial Coin Offerings (ICOs) and tokens lies in their roles within the context of blockchain-based projects and cryptocurrency ecosystems. An ICO is a process or event for raising funds, while a token is the digital asset that is issued and sold during this event. The specific value and function of a token depend on the structure of the project it is associated with.

However, China's supervision of ICOs and tokens is consistent, and no special distinction is made. If the token market is chaotic and unstable, it will have a counterproductive effect on the

⁴⁸⁴ Xiaonan Liang, 'Research on Administrative Behavior Make Inquiries' CASS, (2015)

⁴⁸⁵ *Qian Chen* (n41)

ICO or even be shut down directly. Therefore, when analyzing the supervision of ICO, the performance of tokens is a significant factor.

At present, mainland China has wholly banned ICO and all related trading activities through two regulatory actions.⁴⁸⁶ First, in 2013, the PBOC, together with the other four departments, issued a “Notice on preventing Bitcoin risks”.⁴⁸⁷ In this notice, the regulators clarified the three points: nature of Bitcoin and believed that Bitcoin was not issued by the monetary authority, had no monetary properties such as legal compensation and compulsion, and was not a real currency;⁴⁸⁸ Bitcoin is a specific virtual commodity, and investors buy it at their own risk; virtual currency trading platforms must be filed with telecommunications regulatory agencies in accordance with the law and comply with Chinese supervision. At this stage, China still adopts a relatively tolerant wait-and-see attitude towards ICOs and digital currencies. At this time, China's ICO market has not yet experienced severe instability.⁴⁸⁹ Chinese regulators are from a conservative perspective and merely prohibit financial institutions from participating in virtual currency-related activities.

Then, three years after, the attitude of Chinese regulators towards ICOs and cryptocurrencies has taken a sharp turn. In 2017 September, the PBOC, together with the other six departments, issued the “Announcement on Preventing the Risk of Token Issuance Financing.”⁴⁹⁰ In this

⁴⁸⁶ Regulators of Hong Kong adopted different attitudes toward the ICOs and cryptocurrencies. The cryptocurrencies are divided into three categories: security cryptocurrency, functional cryptocurrency and virtual goods. For different types, Hong Kong regulators have adopted different regulatory policies. For example, there are relatively clear regulatory requirements and implementation rules for security-based cryptocurrencies; but there are relatively few regulatory policies for non-securities-based cryptocurrencies. Regulatory requirements are mainly reflected in the provisions of other laws, such as anti-money laundering, anti-fraud, and anti-terrorist financing.

⁴⁸⁷ The other four departments are Ministry of Industry and Information Technology, China Banking Regulatory Commission, China Securities Regulatory Commission and China Insurance Regulation Commission (now the China Banking and Insurance Regulatory Commission).

⁴⁸⁸ See at http://www.gov.cn/gzdt/2013-12/05/content_2542751.htm PBOC (2013) accessed 25 May 2021.

⁴⁸⁹ In 2017, 90% of ICOs operated in China are highly suspect as being associated with illegal fundraising or fraud while only 1% of funds raised through ICOs are used for the development of block-chain projects. see at Hui Deng, Robin Hui Huang and Qingran Wu, 'The regulation of initial coin offerings in China: problems, prognoses and prospects' (2018) 19 European Business Organization Law Review 465

⁴⁹⁰ The other six departments are: Office of the Central Cyberspace Affairs Commission, Ministry of Industry and Information Technology of the People's Republic of China, State Administration for Industry and Commerce of the People's Republic of China, China Banking Regulatory Commission, China Insurance Regulatory Commission and China Security Regulatory Commission.

announcement, the regulators first time clarification of the illegal nature of ICO in mainland China. The regulators considered that ICO is essentially an unauthorized public financing behavior, suspected of illegal sale of tokens and coupons, illegal issuance of securities, and illegal fundraising, financial fraud, pyramid schemes, and other illegal and criminal activities.⁴⁹¹ The announcement, this time, completely defined ICO as an illegal act in China, and any taking financing platforms were not allowed to engage in the exchange business between legal currency tokens and cryptocurrencies. Regarding the prohibition of trading and fiat currency exchange on ICO financing trading platforms, Chinese regulators are actually trying to exclude ICOs from mainland China at the root. So far, ICOs have completely withdrawn from the Chinese market, but digital mining is still developing rapidly in China.

3.2 The rationales behind the ban

In general, China's regulation of ICOs is a one-size-fits-all and ex-post regulation model. This model may have been effective in dealing with the chaos of the ICO market at the time, but in the long run, its complete ban on ICOs is not the best choice, and many startups have lost access to financing. This section will assess what is reasonable and unreasonable in China's regulatory actions on ICOs, and what to do if China wants to lift the ban on ICOs in the future.

In China, many official notifications are relatively brief, and it does not provide a more detailed argumentation process. There are many reasons behind China's ban on ICOs. Regarding the reasons for China's ban on ICO and cryptocurrency, it can be examined from the following four perspectives: official perspective, legal perspective, technological development perspective, and market regulation perspective.

(1) Official Perspective

In the three announcements, the explanation for the reason is “for the safety of citizens’ property and stabilize the economic and financial order and prevent the prevalence of speculation.” The

⁴⁹¹ Ibid (n 24)

reasons are well understood by the public. First, the number of criminal activities related to digital currencies and ICOs in China is relatively large, involving a large number of people and a large amount of money. From 2015 to 2016, Chinese public security organizations have handled more than 270 cases of digital currency pyramid schemes involving more than 90 kinds of currencies. Most of the cases involve tens of thousands of members, some even hundreds of thousands of people, and the amount of money involved is also hundreds of millions of RMB, some even tens of billions of RMB.⁴⁹² In this case, it is not difficult to understand that in 2017, regulators suddenly issued a ban on ICOs.

Second, maintain China's financial order (stability) because the ICO and cryptocurrency is a market full of the bubble economy.⁴⁹³ The bubble of ICO can be judged from two aspects: first, the value of general blockchain cryptocurrency and its corresponding price. Second, the value derived from the token is based on its own nature and its corresponding price. For the first aspect, in 2015, the global ICO financing amount was only 91 million RMB. By June 2017, the funds raised had soared to 1.4 billion yuan and reached 5 billion yuan in August. Only 65 ICO projects conducted in China that year were raised to RMB 2.62 billion, and the number of participants reached 105,000.⁴⁹⁴ As an integral part of the value of the token and the exchange relationship between the two at the time of the project launch, the price of the applicable blockchain cryptocurrency can be regarded as one of the costs of acquiring the token and will be reflected in the token price. From this point of view, the price in this part is overestimated compared with the value of the general blockchain cryptocurrency part of the token value. For the second aspect, the report of Ernst&Young pointed out that: most of the ICO projects that behave well are focusing on blockchain infrastructure construction rather than developing the blockchain application and business ecosystem projects.⁴⁹⁵ Moreover, from the perspective of project progress, many ICO projects only exist in the white paper and have not been transformed into specific blockchain applications. Among the ICO startups surveyed, only 29% (25) have

⁴⁹² Kangzhen Li, 'Investigation of Pseudo Digital Currency MLM Cases' ZGRMGADX (2019)

⁴⁹³ The so-called bubble economy refers to a large amount of speculative funds staying in a certain virtual economy, causing the virtual asset to over-expand, and the asset value exceeds the real economy. Therefore, the virtual asset is easy to burst like a bubble.

⁴⁹⁴ Zhenxiang Yang, 'Research on the Formation Mechanism of ICO Bubble and Its Supervision Path,' Gansu Finance, (2020) p16

⁴⁹⁵ Ernst & Young, 'EY study: Initial Coin Offerings (ICOs) The Class of 2017-one year later,' (2018) <https://assets.ctfassets.net/sdintm3tthp6/6PAzONkG9aIWqScKEocW6/c835738849ad7fb9a22a3e59e48a05e9/e-y-study-ico-research.pdf> accessed May 24th 2021

available products or prototypes.⁴⁹⁶ In contrast, many companies have actually abandoned ICO investors by weakening their tokens (for example, 7 of these 25 companies accept both traditional legal tender and ICO tokens).⁴⁹⁷ In fact, the many of ICO projects have no development prospects, they are purely speculative tools, and investors do not consider them at all. A typical example is Dogecoin, which is an exceptional currency. It has no technological innovations and is not profitable. The currency was originally created for the purpose of jokes, but it is stimulated by speculation in the market. Its market value has exceeded 500 million U.S. dollars.⁴⁹⁸ Therefore, based on the facts above, it is reasonable to believe that the ICO market has a tulip bubble, this is because of the influx of speculative funds. China, as the most prominent ICO market, the risks after the bubble is burst are also very serious, so it makes sense for regulators to directly stop the ICOs in China.

(2) Legislative perspective

From a legislative perspective, there are two main reasons why ICOs have not been legalized and eventually banned in mainland China. First, there are no appropriate provisions in China's current laws to give ICOs a proper legal status, and instead they may tend to be identified as illegal fundraising. Second, there is no assessment standard that similar to the US's Howey test in China's Securities Law to determine whether a DAO (Decentralized Autonomous Organization) or ICO is an investment contract.

For cryptocurrency, the announcement of 2013 describes that "Bitcoin is not issued by the monetary authority and is not a real currency. It is a specific virtual commodity and cannot and should not be used as currency in the market."⁴⁹⁹ As for the ICOs, in 2017, it is defined as an illegal financing activity, and there are three reasons for this. First, since the virtual currency is not legal tender, it cannot be used as a financing tool for the issuance. Take stock as an example. According to the "Company Law", it allows shareholders to use the currency to make capital contributions, as well as non-monetary properties that can be valued in currency and transferred

⁴⁹⁶ Ibid.

⁴⁹⁷ Ibid

⁴⁹⁸ Ibid (n 41)

⁴⁹⁹ Ibid (n 35)

in accordance with the law, such as physical objects, intellectual property rights, and land use rights.⁵⁰⁰ Also, it stipulates that when a promoter publicly raises shares from the public, the promoter shall sign an agreement with the bank to collect the stock.⁵⁰¹ Even if virtual currency such as Bitcoin and Ethereum can be used as a valuable “virtual commodity” as a non-monetary property as the sponsor’s capital contribution, it cannot meet the requirement of the company law. However, when publicly offering shares to the public, the raised “share money” is legal in practice.

Also, it is unclear whether the tokens on the blockchain conform to the legal form of securities in a narrow sense, and there are problems with the trading of narrowly defined securities in the form of publicly issued tokens. In the Chinese Company Law, the stock form can only be in paper form or other forms prescribed by the China Securities Regulatory Commission.⁵⁰² In the ICO project, the token exists in the form of a digital code on the blockchain. Whether this form is in compliance with the legal form of stocks has not been clearly defined by the China Securities Regulatory Commission. For the token transactions, in practice, the tokens issued by ICO projects will be traded on the secondary market, namely the token exchanges, but these token exchanges currently do not have the legal status required by the Chinese Securities Law. Because in the Chinese Security Law, it should be listed and traded on a stock exchange established in accordance with the law or transferred on other securities trading venues approved by the State Council.⁵⁰³ Therefore, both ICO and cryptocurrency do not conform to the requirements of company law and securities law in terms of form and transaction procedures.

In addition, in China's securities law, there is no test to determine whether a certain form of investment is an investment contract.⁵⁰⁴ For example, the Decentralized Autonomous Organizations constitutes an illegal absorption of public deposits under Chinese law.⁵⁰⁵ Other countries, such as the United States, have merged the DAO with existing securities laws and

⁵⁰⁰ See Article 27, Company Law of the People’s Republic of China, Order No.42 of the President of the People’s Republic of China, Effective date January 1st, 2006.

⁵⁰¹ Ibid, See Article 89.

⁵⁰² Ibid See at Article 129.

⁵⁰³ See Article 37, Securities Law of the People’s Republic of China, Effective data July 1st 1999.

⁵⁰⁴ In the Chinese Contract Law, Investment contracts are not a separate and exclusive type of contract, but refer to all contracts involving the investment category.

⁵⁰⁵ Decentralized Autonomous Organization (DAO) is an organization represented by rules encoded as a computer program that is transparent, controlled by the organization members and not influenced by a central government. See at N Prusty, ‘Building Blockchain Projects’ (2017)

granted it legal status. The United States is currently the first country to apply its laws to the DAO token. The application logic behind it can provide legislative suggestions for cases in China and the United Kingdom. Unlike in the U.S., the SEC determined that the DAO token meets the Howey Test criteria established by the U.S. Supreme Court and belongs to the investment contract under the U.S.⁵⁰⁶ Securities Act of 1933, and therefore belongs to securities under the U.S. Securities Act.⁵⁰⁷ China's current securities legal system adopts a narrow definition method for the definition of securities, including stocks, corporate bonds, government bonds, securities investment fund shares, and other securities recognized by the State Council in accordance with the law.⁵⁰⁸ A new form of investment, if it wants to be recognized as an investment contract, either Chinese regulators will issue relevant laws and regulations to recognize it as an investment contract, or the court will judge it as an investment contract during the trial of the case. But so far, there are no cases of these two types in China. therefore, in China's current legislation, there is no similar investment contract test, and there are no relevant cases that can identify an ICO as an investment contract.

The use of funds in investment contracts under the U.S. Securities Law is more likely to be identified as illegal fundraising under Chinese law. There are four conditions that constitute the Howey Test standard: money investment, common enterprise, expected profits, and the efforts of the promoter or a third party.⁵⁰⁹ In China, the Supreme People's Court issued "Interpretation of the Supreme People's Court of Several Issues on the Specific Application of Law in the Handling of Criminal Cases about Illegal Fund-raising." In the Interpretation, Article 1 stipulates the four conditions for illegally absorbing public deposits or absorbing public deposits in a disguised form: absorb funds without the approval of relevant departments or borrowing legal operations publicity to the society through media, promotion meetings, flyers, mobile phone text messages; commitment to repay the principal and interest or pay the return within

⁵⁰⁶ The Howey Test refers to the U.S. Supreme Court case for determining whether a transaction qualifies as an "investment contract," and therefore would be considered a security. The definition is 'a contract, transaction or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or a third party.' See at SEC v. W. J. Howey Co. 328 U.S. 293 (1946)

⁵⁰⁷ The 1933 Securities Law clearly included the "investment contract" in the scope of securities, which was different from the listed other typical securities such as stocks and bonds, but included securities that did not have typical securities attributes into the 1933 Securities Law Adjustment range. Moreover, The U.S. judicial system has also established judgments through typical cases such as SEC VWJ Howey Co.; International Brotherhood of Teamsters V. Daniel; SEC V. SG Ltd; United Housing Foundation, Inc. V. Forman; SEC V. Merchant Capital, LLC. Whether the investment arrangement belongs to the Howey test criteria of an investment contract and refines the various components of the test criteria.

⁵⁰⁸ Ibid (n 50) Article 2.

⁵⁰⁹ Ibid (n 52)

a certain period of time in currency, kind and equity; and absorb funds from the public, that is, socially unidentified objects.⁵¹⁰ In this case, the feature of ICO seems satisfied with the China's illegal fundraising criteria. This example illustrates that, since there is no legal test to recognize ICO as investment contract, so the investment contracts cannot be legalized within China. This also explains why the Chinese government has not supported the continued development of investment contracts like the US government.

To be specific, in the Interpretation, the “absorb funds without the approval of relevant departments or borrowing legal operations” corresponds to “one-party absorbs fund, one party invests funds.” It can constitute the monetary investment in the Howey Test criteria. As for the “reasonable expectation of gaining income,” the conditions listed in the ‘Illegal Fundraising Interpretation’ include “committing to repay the principal and interest in the currency, in-kind, equity or in return within a certain period of time.” If one party promises to “repay principal and interest or pay in return”, the other party has a reasonable expectation of gaining income accordingly. Regarding the third condition, “reply on the management efforts of others”, it is a little complicated. Article 2 of the Interpretation listed some specific behaviors such as commitment, repayment of principal and interest or payment in return, after-sales charter, repurchase agreement, generation of planting, rental planting, joint planting, commodity repurchase, and consignment sale. These behaviors can be interpreted as an implicit passive investment, which means the profit mainly depends on the management efforts of other persons, such as the initiator or a third party. In the fundraising cause, the fundraiser promises a return, indicating that the profit does not come from the investor's own efforts but from the fundraiser. As for the condition of a joint enterprise, when the fund-absorbing party is an enterprise or business organization, and the funds are usually pooled, or the public relies on the professional skills of the fund-absorbing party, and the effect of the fundraiser's operation affects both the fund-raiser and the investor, this condition is also easy to meet.

In conclusion, a set of standards that are considered securities in the United States cannot be applied in China, and its standards would be considered illegal fundraising in China. In China's current legislation, DAO, ICO, and cryptocurrency do not have legal status and cannot be recognized by Chinese law. Unless China specifically amends laws or adds new legislation for

this purpose. Therefore, even if China wants to legalize ICO, the existing legal system cannot provide the soil, and it may be tended to be regarded as illegal fundraising. It cannot be denied that, as a centralized country, the fact that the current laws do not provide a basis for ICOs is not the main obstacle. China may be more inclined to consider the protection of investors and the stability of the financial market.

(3) Customer protection perspective

China's ICO market has been out of control and failure around 2017, and the market is flooded with frauds. Given the specific circumstances of the China's ICO market, 90% of China-based are said to be scams.⁵¹¹ The issuers taking advantage of investor's lack of knowledge about how ICO works and their desire for high returns. Before 2017, the countries with the most ICO investors were predominantly the United States, Russia, and China. Large numbers of investors in China could suffer huge losses if left unprotected.

From the perspective of market, China's ICO has been in a state of failure in the later stage. Two factors that have the greatest impact on the Chinese market are the information asymmetry of the ICO itself and the extremely irrational speculative behavior of investors. Although all the ICOs should have a whitepaper,⁵¹² which contains all the detailed information of the projects, China did not have any laws and regulations that required what kind of information should be disclosed in the Whitepaper.⁵¹³ In other words, Chinese regulators may not have believed that ICOs needed to be subject to strict supervision like IPOs, such as requiring issuers to issue white papers as strictly as IPO prospectuses. In this case, information asymmetry will damage customer's right to know. The lack of regulation has resulted in basically no protection for ICO investors. Eventually, the quality of ICOs in China are dubious, and endless stream of ICO Ponzi schemes. China put the economic stability and sustainable development on a high position, and ICO had severely affected the stability of the financial market at the time.

⁵¹¹ Finet.HK, 'ICO was characterized as illegal fundraising, crush of overnight dreams', http://www.finnet.hk/Newscenter/news_content/59aa5805e4b0d1966a2a57e1 accessed 14th November 2021

⁵¹² While it is not a compulsory legal requirement that all ICOs have a whitepaper, it is considered a standard industry practice.

⁵¹³ Deng, Huang and Wu, 'The regulation of initial coin offerings in China: problems, prognoses and prospects'

Also, at that time, China's ICO market was full of a lot of speculation and extremely irrational investors. The "Report on the Development of Domestic ICOs in the First Half of 2017" issued by the National Internet Financial Security Technical Expert Committee pointed out that a total of 65 domestic ICO projects have been completed in the first half of 2017, with a cumulative financing scale of 2.616 billion yuan and a cumulative number of participants of 105,000.⁵¹⁴ The proliferation of vicious short-term transactions in ICOs and the excessive fluctuations in the value of digital currencies reflected the irrational choices made by a large number of investors on ICOs at that time.⁵¹⁵ Just like the example mentioned earlier, the ICO project PressOne, which relied on celebrity effects, could still raise 500 million RMB even without a white paper, attracting 40,000 people to participate, which shows that China's ICO market was highly speculative at that time. It is known that when a market is dominated by speculative investors, it can lead to some issues like: increased volatility, asset bubble, misallocation of resources and short-termism.

(4) Technological development perspective

China's total ban on ICOs and cryptocurrencies has been criticized a lot. Some believe that China's move is a blow to technological innovation and dampens the growth of this potentially beneficial market.⁵¹⁶ Some people think that China's ICO ban is just a temporary measure taken due to the chaotic status of the ICO market. Once the market is stable or the time is ripe, China will reopen the market. That is because China is unwilling to lose the opportunity to be the next big hub of FinTech.⁵¹⁷ As a matter of fact, China's move is partly due to technological development considerations. As early as 2014, the People's Bank of China announced the establishment of a project to issue China's own digital currency, which is called E-CNY. At the end of 2017, upon approval, the People's Bank of China organized some large commercial banks

⁵¹⁴ National Internet Financial Security Technical Expert Committee, 'Report on the Development of Domestic ICOs in the First Half of 2017', 2017 https://www.ifcert.org.cn/res/web_file/1501062824386085029.pdf accessed 14th November 2021

⁵¹⁵ Yanni Zhang and Hao Zhang, 'Research on the status quo of ICO development and its regulatory issues' (2018) *Finance and Economy* 76

⁵¹⁶ Deng, Huang and Wu, 'The regulation of initial coin offerings in China: problems, prognoses and prospects'

⁵¹⁷ *Ibid*

and related institutions to jointly develop the digital renminbi system (DC/EP).⁵¹⁸ China is a world leader in the field of digital currency, and so far, the PBOC has issued digital RMB worth more than 100 million.⁵¹⁹ It is reasonable for the People's Bank of China to issue its own digital currency when the cryptocurrency is out of regulation because the digital currency issued by the central bank can effectively prevent money laundering. PBOC mainly uses the following two channels to prevent money laundering: First, the classification and quota arrangement of digital wallets. For example, the user uses a mobile phone number to register a wallet, but without real-name authentication and counter withdrawal procedures, the wallet can only be used for small payments. Second, monitor abnormal transactions through big data. Regulators will monitor the time, amount, and frequency of transactions to detect whether there are money laundering activities.⁵²⁰ In addition, China's digital currency still maintains a certain degree of anonymity, trying to find a balance between user privacy and fighting crime.

Blockchain technology is still relatively new and evolving. By banning ICOs, the Chinese government can encourage innovation and research in the blockchain space to be directed towards more controlled and regulated applications, such as the digital RMB. This can help China maintain a leading position in the development and deployment of blockchain technology. Also, the development and implementation of the digital RMB require a standardized technology infrastructure to ensure interoperability, security, and efficiency. By banning ICOs, China can focus on creating a unified technology infrastructure for its digital currency, rather than dealing with the potential fragmentation and China's regulator can have fully control over the financial system which is in line with China's consistent regulatory principles and objects.

Therefore, China is also considering the ban on ICO and cryptocurrency from the perspective of technological development to a certain extent because it has begun to develop its own digital currency. With more controllable and secure options, it may be a better choice to abandon the ICO market and cryptocurrency. On the one hand, it can be conducive to technological innovation. On the other hand, it can also reduce financial crimes and ensure transaction security.

⁵¹⁸ Fangjun Yao, 'Yi Gang: There is no timetable for when the digital renminbi will be officially launched,' XHS (2020) http://www.xinhuanet.com/fortune/2020-05/26/c_1126035929.htm access May 26th 2021

⁵¹⁹ Financial Times, 'China/blockchain: digital realm', 2021 <https://www.ft.com/content/dd61f916-272b-44d7-ad9e-7ba3625b353d> accessed May 26th 2021

⁵²⁰ Yuan Yang, 'What is China's digital currency plan?' Financial Times (2019) <https://www.ft.com/content/e3f9c3c2-0aaf-11ea-bb52-34c8d9dc6d84> accessed May 27th 2021

In Conclusion, China's ban on ICOs and cryptocurrencies is not simply as described in the official announcement. There may be more complicated reasons behind it, and they could be considered from the perspective of law, market regulation, and technological development. It must be admitted that the Chinese ICO market in 2017 was out of control. China's failure experience with the ICO market is worthy of consideration by other countries. It is worth noting that although ICOs have been banned in China, blockchain technology is still flourishing in China. Accordingly, there may not be a chance to apply ICO to Green Finance in China, but successful cases in other countries may cause China to reconsider the advantages of ICO. As it has been introduced in the Chapter 3, China's Green Finance still faces financing difficulties and the lack of private funds. As mentioned in the previous analysis, ICO is still very advantageous compared to traditional financing methods. If green ICO projects in other countries can be successful, it is not ruled out that China may launch green ICO financing activities in official forms. Just like the development process of cryptocurrency in China, it has finally moved on to the road of cryptocurrency led by the government itself.

4. Critical analysis of the Chinese regulatory framework

4.1 The benefits for ICO prohibition

In general, the ban on ICO could benefit both the market and investors. The ban on ICO in China could be effective to save the market at that time because the ban on ICO and tighter control over the cryptocurrency market helped maintain China's financial stability by preventing capital flight and reducing the impact of speculative bubbles. As it has been discussed, a number of ICO projects are scams and fraud. The ban on ICOs eliminated an avenue for fraudulent activities, such as fake projects and "pump and dump" scheme.⁵²¹ By eliminating projects with no genuine prospects and those with malicious intent, the market's overall stability improved.

⁵²¹ In a pump and dump scheme, unscrupulous individuals often disseminate misleading or false information with the intention of inciting a purchasing frenzy. This artificially inflates the stock's value, enabling the fraudsters to "pump" the price. Subsequently, they "dump" their shares at the elevated price, capitalizing on the artificially created demand. Once the perpetrators cease promoting the stock and divest their shares, the stock's value generally declines, leaving investors with significant financial losses. This deceptive practice highlights the importance of

Also, the ban on ICO promote the clarity of regulation. The ban on ICO provided a clear guidance on the government's stance towards ICOs. First, The PBOC declared ICOs illegal and ordered an immediate halt to all ICO-related fundraising activities. This clear directive made it apparent that the Chinese government would not tolerate ICOs, helping market participants understand the risks and consequences of engaging in such activities.⁵²² Second, the ban also provided guidelines on what constituted illegal token issuance and fundraising activities, detailing the types of activities and services that were no longer permitted. This helped businesses and startups understand the boundaries of the law and the consequences of non-compliance. Third, the ban signaled increased regulatory oversight on digital assets, with authorities actively monitoring and investigating potential violations. This heightened scrutiny further clarified the government's expectations and prompted market participants to adhere to the new regulatory landscape. Last, as a result of the ban, businesses and startups began exploring alternative fundraising methods that were in compliance with existing regulations. This shift led to a more transparent fundraising ecosystem, with projects seeking funds through venture capital, or other compliant channels.

4.2 The potential problems for ICO prohibition

There are also some drawbacks to ban ICO in China, the first being that it completely cuts off ICOs as a vehicle for financing startups, this makes many start-ups lose a low-cost and efficient financing channel and have to turn to traditional financing methods. Second, directly banning ICOs does not cure the root cause for the unstable ICO market. This ban on ICO, on the surface, prohibits the risk of the ICO market, but it has caused another potential problem-- capital outflow.

accurate information and ethical behavior within the financial market. In the ICO case, the mechanism is similar. The Centra Tech is a notable example in the US. It raised over \$25 million in 2017. The issuer claimed that they have partnerships with Visa and Mastercard. In reality, there is no such partnership. The perpetrators manipulated the market by spreading false information to inflate the value their tokens and subsequently sold their holdings, leaving investors with significant losses.

⁵²² People's Bank of China, 'Announcement on Preventing the Financing Risk of Token Issuance' (4 September 2017) http://www.gov.cn/xinwen/2017-09/04/content_5222657.htm accessed 10 March 2023.

As it has been discussed in chapter two, ICOs are great for startups because they can raise a lot of investment early on and cost less compared to traditional financing methods. However, the number of ICOs fell off a cliff after September 2017, as regulators directly banned the ICOs.⁵²³ Since the rectification began, the global share of domestic virtual currency transactions has dropped from the initial 90% to less than 5%, effectively avoiding the adverse impact on investors caused by the price surge and slump caused by the virtual currency bubble and isolating its negative impact on China's financial market. However, this is a very big blow for many tech startups, losing ICOs and having to turn to traditional financing methods, such as venture capital, angel investment, or IPO and crowdfunding. As it has been mentioned in the Chapter two, compared with ICO, these traditional financing methods have higher investment requirements, higher costs and longer cycles. For example, the costs of an IPO can include underwriting fees (often between 4-7% of the gross proceeds), legal and accounting fees, exchange listing fees, printing and advertising expenses, and other related costs.⁵²⁴ According to a 2017 study by PwC, the median cost of an IPO in the United States is \$4.2 million, and ongoing costs can add an additional \$1.5 million per year or more. As for VC, Venture capital financing also involves significant costs, including due diligence costs, legal and accounting fees, and the substantial equity stake (often 20-30% or more) given up to the venture capital investors.⁵²⁵ This undoubtedly adds a lot of difficulties to many small enterprises or start-ups in China in the early stage of financing. In the case of Green Finance, green start-ups also face a similar dilemma. Also, it has been mentioned in the Chapter two section 2.1, The development of green projects may be longer than the general project cycle, so green projects are not very attractive for traditional financing methods. And now that ICOs are banned in China, green start-ups have lost a low-cost and relatively easy and quick way to raise funds.

The second shortcoming is that the ban did not make ICOs disappear entirely from China, and some ICO variants still exist. According to the report of PBOC, in order to avoid the supervision of the September 4th "Announcement," many virtual currency trading platforms "go overseas" and register overseas but still provide virtual currency trading services to domestic users. At the

⁵²³ Greg Pilarowski and Lu Yue, 'China bans initial coin offerings and cryptocurrency trading platforms' (2017) 3 China Regulation Watch

⁵²⁴ PWC, 'Considering an IPO? First, understand the costs,' 2022

<<https://www.pwc.com/us/en/services/consulting/deals/library/cost-of-an-ipo.html>> accessed June 20th 2023

⁵²⁵ Ibid.

same time, many ICO variants have emerged, such as Initial Fork Offering (IFO), Initial Miner Offering (IMO), Initial Exchange Offering (IEO). IFO is a method where projects raise funds by allowing investors to 'farm' or 'yield' tokens. In an IFO, investors provide liquidity in a specific token pair (usually the native token of the exchange and another token), and receive the project's token in return. PancakeSwap is a common platform where IFOs occur. IEOs are conducted on the platform of a cryptocurrency exchange. The exchange acts as a counterparty and launches the IEO on its platform, and the tokens are sold directly from the issuer to the investors. An advantage of IEOs is the immediate liquidity provided by the exchange platform. There are also IMO financing methods that use the sharing economy as a gimmick.⁵²⁶ In response to these problems, the Central Bank continued to crack down on ICOs and virtual currency transactions, and took three measures: first, blocking 124 virtual currency trading platforms service channels that registered overseas but providing virtual currency trading services in China; second, stop providing services to suspicious users from the payment and settlement terminal; third, strengthen the research and judgment on the variant form of ICO.⁵²⁷ The above measures show that China's strict prohibition of ICOs is obvious, and it has not changed yet. However, the ever-changing forms of ICO and the behavior of fleeing abroad are enough to show that, on the one hand, it is not easy to completely ban ICO, which is time-consuming and labor-intensive. Idle funds want to invest in ICO projects, and there are also many consumers who have the need to hold virtual currency to make speculative investments.

4.3 Discussion on China's ban on ICO

Generally speaking, China's management of political economy is based on the concept of stability. China also has some unique concepts to describe it, such as slogans such as maintaining stability and stability above everything else. In fact, this is not difficult to understand. As a country with a large population, China has a large market, so small risks may also cause more serious consequences. China's regulatory strategy in the financial market has always been based on maintaining stability. When a destructive technology such as ICO appeared, the Chinese government was at the beginning of observation. When it was found that the hidden dangers brought by it had affected the stability of the market, the regulators would use the reason of

⁵²⁶ China Economic, 'Shanghai Headquarters of the Central Bank: Constantly grasping the risks of ICO and virtual currency transactions,' PBOC (2018) http://finance.ce.cn/hljwjr/201809/18/t20180918_30333807.shtml accessed on 3rd March 2022

⁵²⁷ Xianglin Deng, 'Study on ICO Legal Issues and Their Regulatory Models,' LZDX (2020)

maintaining stability to remove the unstable factors. —ICO. There are many similar cases, such as P2P lending. From a political point of view, whether it is the blockade of foreign websites such as Google and YouTube in mainland China, or the control of the new epidemic situation, it shows that China always puts stability first when dealing with unstable factors. The UK has a different regulatory attitude towards financial markets and financial technology. On the whole, the UK has an attitude of exploring and encouraging the emergence of new technologies and innovations. Moreover, it also provides some regulatory suggestions in a timely manner by cooperating with technological innovation companies (sandbox is an example). This is one reason FinTech in the UK is able to thrive.

5. Recommendation

Since China has banned all ICO-related activities in 2017, green ICOs may be difficult to achieve in China in the short term. However, according to the regulatory analysis of the UK's green ICO in the previous chapter, China still has something to learn from. For example, although ICO does not exist, China should follow the sandbox system of the United Kingdom, and test all FinTech innovative products in advance in the sandbox to test and evaluate their possible risks.

China has already implemented sandbox supervision in the experimental stage, but so far, it has not yet been officially launched. At present, "IoT-based item traceability certification management and supply chain finance", "Blockchain-based industrial financial services", "AI Bank Inside products", "Baihang credit investigation and credit inclusive services", innovative applications of four financial technology innovation supervision tools Project completed testing.⁵²⁸ The innovation point of the "IoT-based item traceability certification management and supply chain finance" project is to use the IoT blockchain technology to provide item traceability certification services, and integrate traditional banking financial services such as payment and financing with the entire chain of upstream and downstream enterprises and commodity production and sales. Combined supply chain financial services are integrated into commodity production and sales scenarios, which are convenient for enterprises and individual

⁵²⁸ Jichao Yu, 'The Chinese version of the regulatory sandbox runs the "last mile"', Sina, (2021) <<https://finance.sina.cn/bank/yhgd/2021-10-11/detail-iktzscy8948538.d.html>> accessed 22nd June 2023

customers to choose independently. It provides financial services at any time, and create an industrial ecosystem. And "AIBankInside products" open up financial services through Application Programming Interface (API), deeply empowering ecological partners. With the help of API technology, multiple types, standardized and generalized financial function modules can be quickly assembled into industry solutions to serve different industry scenarios. Using a non-invasive connection method, parties in all scenarios can obtain "plug and play" financial services without modifying the existing system architecture. The "Blockchain-based Industrial Financial Services" project aims to establish a relationship network based on blockchain mutual trust to realize high-speed information exchange between upstream, midstream and downstream enterprises, financial institutions, logistics, and the government in the supply chain, and to solve supply chain problems. Problems in cooperation, trust and data security of participating institutions in financial services, can rely on big data and artificial intelligence technology. Financial institutions can quickly make financial service decisions and solve the problems of financing difficulties and expensive financing of traditional small, medium and micro enterprises; adopt zero Knowledge proof and other technologies can improve the speed of basic business verification, enhance the protection of private information of enterprises, and improve the trust between enterprises.

5.1 Regulatory Sandbox for China

As it has been mentioned in the Chapter 2, the UK's Regulatory Sandbox allows firms to test innovative propositions in the market with real consumers. It's open for applications at any point throughout the year.⁵²⁹ To be specific, it detects the ability to test products and services in a controlled environment, an opportunity to understand whether a business model is attractive to consumers, or how a particular technology works in the market Reduce time-to-market at a potentially lower cost, to support the identification of consumer protection safeguards that can be incorporated into new products and services.⁵³⁰ The construction of China's regulatory sandbox is necessary. First, from the previous discussions about China's regulatory strategy, it can know that China, as a highly centralized country, actually tends to exert as much control

⁵²⁹ FCA, 'Regulatory Sandbox', (2022) < <https://www.fca.org.uk/firms/innovation/regulatory-sandbox> > accessed 21st June 2023

⁵³⁰ Ibid.

over the development of the financial market as possible in order to maintain market stability. The regulatory sandbox, as an early test of technological innovation products, can help Chinese regulators predict the stability and risks of FinTech products in advance, thereby reducing the adverse effects and risks that may be caused by products being launched into the market. If, at that time, China had its own sandbox testing, and all ICO activities required mandatory testing, then China's ICO market might be more regulated, and it would not lead to the dismal exit of the final ICO.

Second, the sandbox can boost more financial innovation in China. Sandboxes allow for greater innovation in the financial sector. They create a safe space for businesses to test new technologies, business models, and products without immediately having to comply with all regulatory standards. As discussed in the Law and Regulation chapter, since the development of law and regulation always follow the technology, and the market impact caused by disruptive technologies such as ICO, P2P can sometimes be negative, China's regulatory logic based on its stability may be eventually opted to ban the development of the technology. Sandbox regulation can solve this problem, and at the same time provide a signal to technology innovators that even if there are risks, there are still pre-procedure tests before they are put into the market, and regulators will not suddenly ban the technology across the board. They allow for greater control of the risks associated with financial innovation. By keeping the testing on a small scale and under close observation, the potential negative impacts can be better managed.

Besides, the regulatory sandbox can not only reduce the risk of FinTech innovation, but also improve the development level of China's RegTech. Currently, China's financial regulation focuses on requiring data reporting. However, there are many requirements for data reporting, and the field definitions are not uniform. Taking the CBRC EAST data collection system and analysis as an example, the entire EAST report has 1,600 fields. This actually adds an extra workload to many FinTech companies. RegTech can transform data rules from reported data to real-time online business data. On this basis, design rules, introduce big data and artificial intelligence platforms, and discover anti-money laundering, rat warehouses, regulatory arbitrage, etc. In real time, all of these situations can be effectively used artificial intelligence. In addition, with the improvement of regulatory capabilities, China can realize the transformation from passive supervision to active supervision, and the supervision will take the initiative to identify

risks even earlier than financial institutions. For example, The Hong Kong Stock Exchange uses the commercial search engine Handshakes to analyse actual cases of insider trading.⁵³¹ In fact, it uses the data of external news and structured and unstructured databases to find the relationship between the equity or business of different listed companies; The correlation between fluctuations and ups and downs; by collecting the structure of the corresponding equity, capital flow, and the degree of correlation between them and the fluctuation of stock prices in the secondary market, it can more clearly grasp the possibility of various insider transactions in the market. In addition, the "Baihang Credit Information Inclusive Service" is the first batch of application projects in Shenzhen to be publicized and tested. By connecting with Futian's government approval system, the project applies credit data to various government approvals and payment services handled at the on-site service window, so as to realize the rapid processing of government services.

There are some reasons why China didn't start Sandbox early. First, China's regulation is promoted by regulatory agencies in a single line. The development momentum of regulatory technology in my country is mainly promoted by the unilateral R&D of regulatory agencies. There have not been large-scale cases of independent research and development and vigorous promotion by regulatory technology institutions. Even if there are research behaviours of some financial technology groups, most of them are through the use of supervision. Technology promotes the Group's compliance development and has no intention to promote its key research and development in the market. Therefore, in the environment of this regulatory model, sandbox regulation, a model that involves regulators and financial technology companies, does not have a very suitable growth soil.

Second, China's financial regulatory philosophy has not changed much. The financial regulatory method that China has always adopted is the model of separate supervision and passive supervision. However, financial technology products often span different markets and carry certain risks. Therefore, regulation in the traditional sense cannot well monitor the risks brought by financial technology. Sandbox supervision is different from China's traditional supervision

⁵³¹ HKEX, 'Research Report FinTech Application and Regulatory Framework', (2018)

methods and is more proactive. China's regulatory approach as a whole has not yet shifted to a proactive regulatory model.

Third, China's traditional financial supervision does not adequately protect consumer rights. Under the "regulatory sandbox" model, it not only encourages financial technology innovation, but also emphasizes the effective protection of consumer rights and interests. The "regulatory sandbox" model does not allow financial technology companies to infringe on the legitimate rights and interests of consumers under the guise of innovation. However, China's "pilot reform" regulatory model is more traditional. This regulatory model focuses more on prudent operations and defining business boundaries, and places less emphasis on the protection of consumer rights and interests.

Therefore, although China has now tried to launch sandbox supervision, there are certain reasons why it has not been able to implement it on a large scale. This requires a change in China's traditional financial regulatory concepts and models. And this transformation will take some time.

5.2 Discussion for China's sandbox design

Although China currently has sandbox regulation approach in the experimental stage, the current sandboxes are all sandboxes for a certain type of business in a small area. It is nowhere near the scale and maturity of the UK's regulatory sandbox. Therefore, China can learn from the experience and design of the UK's regulatory sandbox to build a Chinese regulatory sandbox. At present, the following aspects can be discussed, the first regulatory requirements, and the second regulatory standard is the content.

In the UK, the FCA usually consider five aspects when they test the financial products: first, whether it meets the standards of innovation, whether it is new, and whether it is similar to existing products; second, whether the product is beneficial to consumers or investors; third, whether the company is a financial service company; fourth, whether the performance of the

product is suitable for sandbox testing; fifth, whether the product operating company is under the control of FCA.⁵³² The Chinese sandbox can follow these rules to make judgement if the financial products are suitable for the sandbox.

The scope and objectives of China's sandbox can mainly aim to encourage innovation while ensuring consumer protection. Given China's particular concerns about financial stability and control of the financial system, it might also place a heavier emphasis on these aspects. For the application and approval process, China can follow UK's application process which means firms would likely need to apply for participation in the sandbox and receive approval from regulators. Companies interested in participating in the sandbox would submit an initial application providing details about their business, the innovation they wish to test, the potential benefits and risks to consumers, and how they plan to manage those risks. The relevant regulatory authority, potentially the People's Bank of China or the China Banking and Insurance Regulatory Commission, would then screen these applications. They would likely assess factors such as the innovativeness of the proposal, its potential benefits for consumers or the financial system, the company's ability to manage risks, and possibly alignment with national strategic goals. Companies that pass the initial screening may be asked to submit a more detailed proposal, outlining their testing plans, risk management strategies, and customer protection measures. They might also need to provide details on their business model, financial situation, and the expertise of their team. If the detailed proposal is satisfactory, the regulatory authority would then approve the company to participate in the sandbox. This approval might come with certain conditions or requirements, depending on the nature of the proposed innovation. Once approved, the company would need to comply with all rules and regulations of the sandbox throughout the testing period. This could involve regular reporting to the regulatory authority, close monitoring of testing activities, and immediate action to address any issues that arise. At the end of the testing period, the regulatory authority would evaluate the results and decide whether the company should be allowed to launch its product or service in the broader market, possibly under certain conditions or restrictions.

⁵³² Ibid.

5.3 Experience from Yue Tan

In addition, Yue Tan is a quick and effective means of regulation which can promptly remind and guide problems and avoid them from amplifying. Yue Tan are different from negotiations in that they usually take place in China between two parties with relatively unequal power. As the regulator, the interviewed party usually does not have much room for bargaining. This approach has been controversial since its emergence in 2007. Because it is not formally enshrined in any written regulations, it may involve abuse of power or even violate the administrative law principle of lawful administration. On the other hand, however, its effectiveness is not in doubt. The existence of the system can also be seen as being in line with China's overall approach to regulation: paternalistic, ex post facto regulation.

Such an approach can really only exist in a special regulatory environment and soil. If the UK government were to adopt such an approach, it might be challenged by business because it would not have the legitimacy to support the government in adopting such a regulatory approach. But it is an approach that can be effective in stopping the spread of risk in the event of an emergency in the financial markets. But if the UK government were to adopt a similar approach to regulation, it would need to discuss carefully the circumstances in which it would be applied, otherwise it would be vulnerable to abuse of power.

5.4 Experience from the UK

Although China still has not lifted the ban on ICO, if one day the ban is lifted or similar technologies appear. As a relatively good case, the United Kingdom has many experiences that China can learn from.

The first is the clear and in time guidance from the regulator. The FCA has provided clear guidance on which types of crypto-assets fall within its regulatory perimeter. For instance, it differentiates between exchange tokens (like Bitcoin), utility tokens, and security tokens, providing clarity for businesses and consumers. However, China gave the official definition of ICO very late, and has been in a state of acquiescence, which led to its brutal growth, until finally when the situation got out of control, it announced a complete ban on ICO.

The second is the regulatory sandbox, as it has been discussed above. The UK has been known for its regulatory sandbox approach, which allows businesses to test innovative products, services, models, and delivery mechanisms in a controlled environment without immediately incurring all the usual regulatory consequences. Sandbox regulation is not only a regulatory innovation, but also a difference in regulatory strategy. If China wants continuous technological innovation, it should also adopt a similar regulatory approach, actively participate in regulatory innovation, and encourage technological innovation.

Third, the UK is trying to balancing innovation with regulation. This point is more about regulatory strategy and attitude. The FCA's approach tries to strike a balance between protecting consumers and allowing for financial innovation. Instead of outright bans, it focuses on understanding the crypto landscape and developing regulations that ensure a safer environment for consumers and businesses. In fact, a welcoming attitude toward innovation can attract businesses and investment. In the crypto and blockchain space, this means allowing startups and existing businesses to explore new models, technologies, and ideas without being immediately stifled by heavy regulations. In contrast to China, a large number of ex-post regulation often leads to the market being full of risks, and measures are taken only after the rights and interests of consumers or investors have been damaged. For example, since mainland China has banned bitcoin trading and ICO activities, related mining activities should also be banned at the same time. But four years after ICOs were banned in 2017, the Chinese government decided to crack down on mining. The reason is that "the energy consumption and carbon emissions are large, the contribution to the national economy is low, and the driving effect on industrial development and scientific and technological progress is limited."⁵³³ This kind of overly passive and post-event regulation is not conducive to technological innovation, and post-event regulation has caused great losses to investors and consumers, and it has also led to the rapid demise of the market.

Fourth, the UK's response to cryptocurrencies is worth to learn from. The FCA's accurate categorisation of cryptocurrencies, for example, allows ICO companies to know exactly which

⁵³³ '11 departments jointly issued a notice to rectify virtual currency "mining" activities', Gov.cn, 2021. https://www.gov.cn/xinwen/2021-09/25/content_5639202.htm Accessed on 2023 August 10th.

classification the currency they are issuing falls under. This makes it easier for issuers to comply with regulatory rules and for regulators to monitor them. Also, although the UK's regulations on greenwashing are soft and not mandatory, it is a big step forward compared to China. Many of the requirements for labelling and manufacturers are worth imitating and learning from Chinese regulators.

The UK's self-regulatory model for fintech is also worth learning from. For example, its self-regulatory association for P2P lending, China should also combine self-regulation and government regulation, which can be conducive to the market's self-development, rather than developing according to the regulator's purpose under the government's mandatory requirements. This would also prevent the market from having the only option available to the regulator to ban the market when it becomes risky.

6. Summary

In short, China has chosen to prohibit the ICO from many considerations, but in the end, it falls on the protection of investors and the prevention of crimes. At present, such measures taken by China may indeed make Green ICO lose the possibility of development to a certain extent, and also affect technological innovation. But considering the Chinese government's consistent regulatory strategy of maintaining stability, everything seems reasonable. Whether the Chinese government can find other ways to fill the void of private funding for Green Finance is a question worth looking forward to. For China's regulation on FinTech in the future, China could learn from UK regulatory sandbox. Although China has some sandbox projects, but they have not yet been officially launched, and the scope of application is relatively limited.

Conclusion

This dissertation embarked on an ambitious journey to demystify the confluence of Green Finance and Initial Coin Offerings (ICOs) against the backdrop of two economically influential and distinct nations: the UK and China.

Starting with a deep dive into Green Finance, it became evident that the world is pivoting towards sustainable financial practices. While both the UK and China are making strides in this realm, their trajectories differ, reflecting their unique socio-economic contexts and objectives. The exploration highlighted the burgeoning green markets and the challenges faced, emphasizing the need for innovation in fundraising and financing mechanisms. Enter FinTech and ICOs. As explored in Chapter 2, ICOs have emerged as a groundbreaking fundraising mechanism, driven by technological advancements and changing market dynamics. Their advantages and disadvantages, viewed from various perspectives, underscored their complexity and potential, laying the foundation for their potential application in Green Finance.

Regulatory scrutiny, as detailed in Chapters 4 through 6, is paramount. The UK's progressive regulatory framework offers a holistic approach to Green ICOs, balancing innovation with investor protection. China's more cautious stance, exemplified by its ICO ban and the unique "Yue Tan" regulatory approach, brings forth a contrasting methodology that prioritizes stability and control.

Through a comparative lens, significant divergences and parallels were noted between the UK and China. Both nations, despite their differences, underscore the necessity for regulation in this dynamic intersection. The recommendations proposed for each country draw from their individual strengths and shared learnings, offering potential pathways for enhancing Green Finance practices and ICO regulations. The choice of focusing on the UK and China was deliberate. Their combined economic clout, contrasting regulatory approaches, and shared

commitment to sustainable development provide a rich tapestry of insights and lessons for the global financial landscape.

Every research endeavour, regardless of its depth and breadth, comes with inherent limitations, and this dissertation is no exception. One significant limitation stem from the rapidly evolving nature of both Green Finance and ICOs; the dynamism of these fields means that certain conclusions drawn today might require revisiting in the face of new developments or regulatory shifts. Furthermore, while this study offers a comparative analysis of the UK and China, it doesn't extensively cover the broader global landscape, which may have provided additional context and richer insights. It's also worth noting that the research primarily relied on secondary data, which, while extensive, might not capture the nuanced views of industry practitioners or investors on the ground. As for future research directions, a more in-depth exploration into other emerging economies' stance on Green Finance and ICOs could provide valuable comparative insights. Additionally, qualitative studies, involving interviews with regulators, industry experts, and financial institutions, could offer a richer, more nuanced understanding of the practical challenges and opportunities at the intersection of Green Finance and ICOs.

In closing, as the world grapples with pressing environmental challenges, the fusion of Green Finance and ICOs, if navigated wisely, could catalyse transformative solutions. This research, by delving into the intricacies of this merger within the UK and China's frameworks, hopes to shed light on potential pathways, pitfalls, and prospects. As the domains of sustainable finance and digital fundraising continue to evolve, this dissertation stands as a testament to their nascent potential and the possibilities that lie ahead.

List of References

- Armour J and others, *Principles of financial regulation* (Oxford University Press 2016)
- Akerlof GA, 'The market for "lemons": Quality uncertainty and the market mechanism', *Uncertainty in economics* (Elsevier 1978)
- Albrecht C and others, 'Ezubao: a Chinese Ponzi scheme with a twist' (2017)
- Breyer S, *Regulation and its Reform* (Harvard University Press 1982)
- Bowen F and Aragon-Correa JA, *Greenwashing in corporate environmentalism research and practice: The importance of what we say and do* (Sage Publications Sage CA: Los Angeles, CA 2014)
- Beyleveld D and Brownsword R, 'The practical difference between natural-law theory and legal positivism' (1985) 5 *Oxford Journal of Legal Studies* 1
- Black J, 'Understanding the Role of Regulation and Self-Regulation in a " Post-regulatory' (2001) 54 *World* 103
- Carlson L, Grove SJ and Kangun N, 'A content analysis of environmental advertising claims: A matrix method approach' (1993) 22 *Journal of advertising* 27
- Conway L, 'Consumer protection from unfair trading regulations 2008' (2019) 4678 *Paper no CBP*
- Cahill T, 'Co-operatives and anarchism: A contemporary perspective' (1989) *For Anarchism: History, Theory and Practice* 235
- Chohan UW, 'Cryptoanarchism and Cryptocurrencies' (2017) Available at SSRN 3079241
- Coleman J and Shapiro S, 'The Oxford handbook of jurisprudence & philosophy of law' (2002)

Culkin N, Murzacheva E and Davis A, 'Critical innovations in the UK peer-to-peer (P2P) and equity alternative finance markets for small firm growth' (2016) 17 *The International Journal of Entrepreneurship and Innovation* 194

Civil Code of the People's Republic of China 2021 Art 127

de Freitas Netto SV and others, 'Concepts and forms of greenwashing: a systematic review' (2020) 32 *Environmental Sciences Europe* 1

Delmas MA and Burbano VC, 'The drivers of greenwashing' (2011) 54 *California management review* 64

Deng H, Huang RH and Wu Q, 'The regulation of initial coin offerings in China: problems, prognoses and prospects' (2018) 19 *European Business Organization Law Review* 465

Du X, 'How the market values greenwashing? Evidence from China' (2015) 128 *Journal of Business Ethics* 547

Datta-Chaudhuri M, 'Market failure and government failure' (1990) 4 *Journal of Economic Perspectives* 25

Desai DR and Magliocca GN, 'Patents, meet Napster: 3D printing and the digitization of things' (2013) 102 *Geo LJ* 1691

Furlow NE, 'Greenwashing in the new millennium' (2010) 10 *The Journal of Applied Business and Economics* 22

Fong MW, 'China's Online Peer-to-Peer (P2P) Lending Platforms', *The Digitization of Business in China* (Springer 2018)

Foley S, Karlsen JR and Putniņš TJ, 'Sex, drugs, and Bitcoin: How much illegal activity is financed through cryptocurrencies?' (2019) 32 *The Review of Financial Studies* 1798

Jung JC and Sharon E, 'The Volkswagen emissions scandal and its aftermath' (2019) 38
Global Business and Organizational Excellence 6

George S and Regani S, 'Ecomagination' at Work: GE's Sustainability Initiative', *Managing Sustainable Business* (Springer 2019)

Gilovich T, Griffin D and Kahneman D, *Heuristics and biases: The psychology of intuitive judgment* (Cambridge university press 2002)

Gilovich T, Griffin D and Kahneman D, *Heuristics and biases: The psychology of intuitive judgment* (Cambridge university press 2002)

Gorton GB, *Slapped by the invisible hand: The panic of 2007* (Oxford University Press 2010)

Gao Y and others, 'A 2020 perspective on "The performance of the P2P finance industry in China"' (2020) 40 *Electronic Commerce Research and Applications* 100940

Garreau J, 'Science's mything links: As the boundaries of reality expand, our thinking seems to be going over the edge' (2001) *The Washington Post* C1

Giudici G and Adhami S, 'The impact of governance signals on ICO fundraising success' (2019) 46 *Journal of Industrial and Business Economics* 283

Helleiner E, 'Economic liberalism and its critics: the past as prologue?' (2003) 10 *Review of International Political Economy* 685

Karlstrøm H, 'Do libertarians dream of electric coins? The material embeddedness of Bitcoin' (2014) 15 *Distinktion: Scandinavian Journal of Social Theory* 23

Laufer WS, 'Social accountability and corporate greenwashing' (2003) 43 *Journal of business ethics* 253

Lyon TP and Maxwell JW, 'Greenwash: Corporate environmental disclosure under threat of audit' (2011) 20 *Journal of Economics & Management Strategy* 3

Lobel O, *The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought* (2003)

Mayer R, Ryley T and Gillingwater D, 'Passenger perceptions of the green image associated with airlines' (2012) 22 *Journal of Transport Geography* 179

Magnuson W, 'Regulating FinTech' (2018) 71 *Vand L Rev* 1167

Nelson RM, 'Examining Regulatory Frameworks for Digital Currencies and Blockchain' (2019) 26 *Congressional Research Service* Retrieved November 2020

Ogus AI, *Regulation: Legal form and economic theory* (Bloomsbury Publishing 2004)

Robertson G, *Crimes against humanity: The struggle for global justice* (Penguin UK 2006)

Omarova ST, 'Rethinking the future of self-regulation in the financial industry' (2010) 35 *Brook J Int'l L* 665

Organization WH, 'Quality & Safety in Genetic Testing: An Emerging Concern' (2018) World Health Organization

Pilkington M, 'Blockchain technology: principles and applications', *Research handbook on digital transformations* (Edward Elgar Publishing 2016)

Pagano M and Volpin P, 'Shareholder protection, stock market development, and politics' (2006) 4 *Journal of the European Economic Association* 315

Sowers W, 'How do you solve a Problem Like Law-Disruptive Technology' (2019) 82 *Law & Contemp Probs* 193

Treleaven P, 'Financial regulation of FinTech' (2015) 3 Journal of Financial Perspectives

Wildavsky A, 'Regulatory Policy and the Social Sciences. Roger G. Noll' (1987) 92 The American journal of sociology 1022