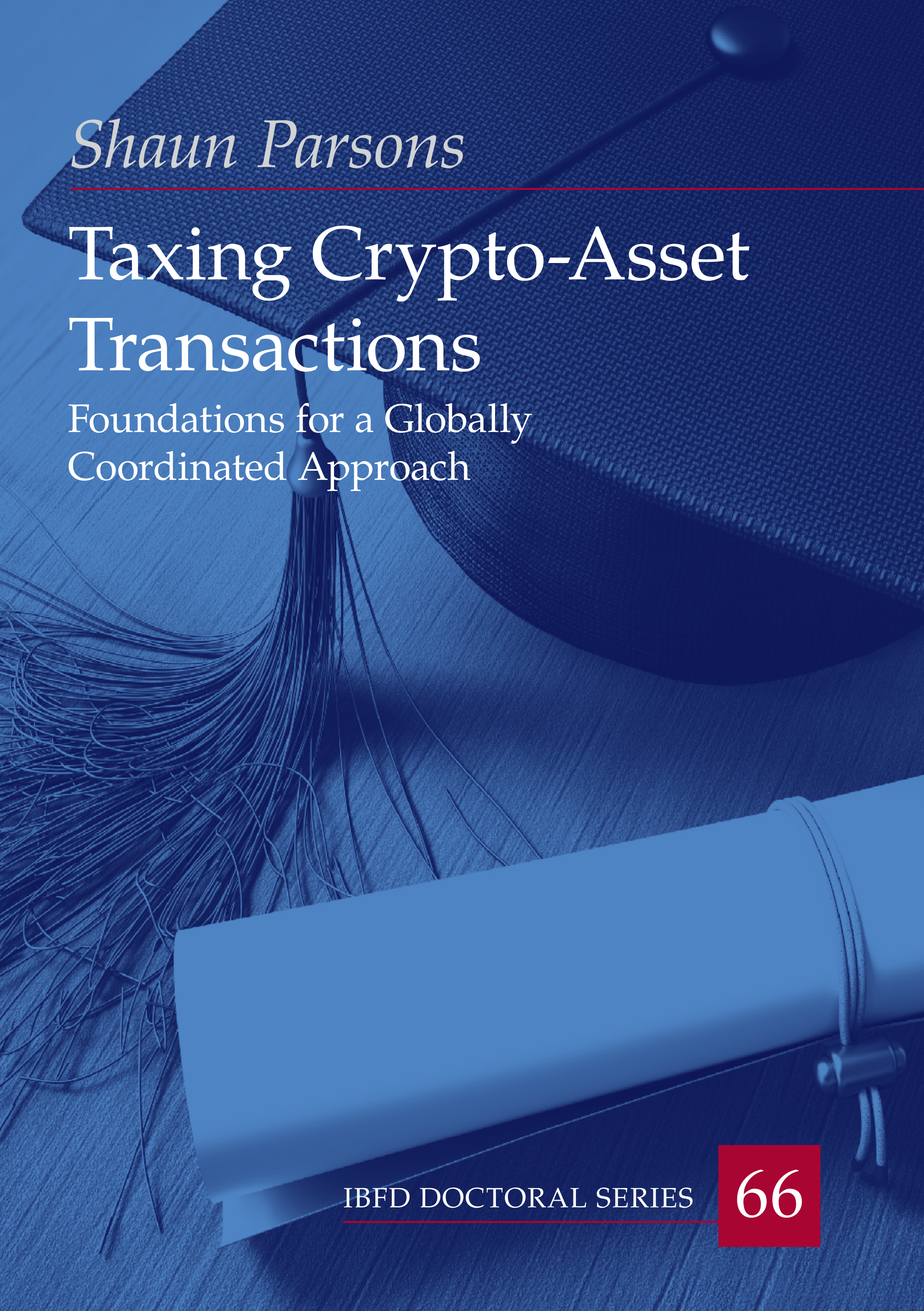

Shaun Parsons

Taxing Crypto-Asset Transactions

Foundations for a Globally Coordinated Approach

IBFD DOCTORAL SERIES 66

Taxing Crypto-Asset Transactions Foundations for a Globally Coordinated Approach

Why this book?

Crypto-assets and blockchain technology have created much uncertainty within the field of taxation. While some jurisdictions have attempted to formulate responses, others have yet to meaningfully engage with the topic. In contrast to the taxation of the digitalized economy, a coordinated global approach to the taxation of crypto-asset transactions is notably lacking.

This study addresses the consequences of crypto-asset transactions within the international tax system. It begins by applying an adapted form of the constant comparison method traditionally employed in grounded theory research to a selection of crypto-assets white papers to inductively identify possible taxable events, and from these to develop ten transaction categories, each with definitive characteristics. These categories then form the basis of a doctrinal analysis of the nature within the international tax system of the income arising and its classification within the text of the articles of the model tax conventions. Finally, the study considers the potential future impact of measures to tax the digitalized economy.

The study finds that while it is possible to classify each of the identified transaction categories within the articles of the model tax conventions, alternative constructions within treaties and existing differences in interpretation may still significantly impact the allocation of taxing rights. In addition, crypto-asset transactions may further challenge the role of the permanent establishment concept in determining taxing rights and contribute to base erosion. While such transactions may fall within the measures to tax the digitalized economy, the pseudonymous, decentralized nature of blockchain technology may frustrate the application of these measures.

This study may inform individual jurisdictions in designing the scope and outcomes of a comprehensive response to crypto-asset transactions. It may also provide a basis for the classification of these transactions within the international tax system, and support the development of a globally coordinated response to the taxation of crypto-assets. Finally, it may contribute to the broader development of the taxation of the digitalized economy, in which crypto-asset transactions may play an increasingly significant role in the future.

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Taxing Crypto-Asset Transactions

Foundations for a Globally Coordinated Approach

Shaun Parsons

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Visitors' address:
Rietlandpark 301
1019 DW Amsterdam
The Netherlands

Postal address:
P.O. Box 20237
1000 HE Amsterdam
The Netherlands

Telephone: 31-20-554 0100
Email: info@ibfd.org
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Table of Contents

Acknowledgements xiii

Chapter 1 Introduction 1

1.1. Crypto-assets, the digitalized economy and the international tax system 1

1.2. The creation of Bitcoin 2

1.3. The global proliferation of crypto-assets 6

1.4. Overview of this book 9

Chapter 2 Research Objective and Methodology 11

2.1. Research objective 11

2.2. Research paradigm 12
2.2.1. The legal research paradigm 12
2.2.1.1. Doctrinal research and comparative analysis 13
2.2.1.2. Reform-oriented research 14
2.2.2. Normative frameworks applied 14
2.2.2.1. The OECD Model 15
2.2.2.2. The UN Model Double Tax Convention between Developed and Developing Countries 16
2.2.2.3. The text of the articles of the model tax conventions 16
2.2.2.4. The principles of good tax design 17

2.3. Research methodology 20
2.3.1. Selection of the constant comparison research method 20
2.3.2. Application of the adapted constant comparison research method to this book 22
2.3.3. Use of computer-assisted qualitative data analysis software 24

Chapter 3 Review of the Current State of the Taxation of Crypto-Assets 25

3.1. Introduction 25

3.2. Observations 26
3.2.1. Differences in terminology 32
3.2.2. Differences in identity or nature 39
3.2.3. Limited number of legislative amendments 40
3.2.4. Differences in scope of taxpayers addressed 40
3.2.5. Differences in depth and breadth of engagement 41
3.2.6. Relative consistency in VAT treatment 43
3.2.7. Consensus on lack of fiat currency status 46
3.2.8. Contrasting positions on income tax consequences in different jurisdictions 49

3.3. Conclusion 53

Chapter 4 Crypto-Asset Analysis 57

4.1. Introduction 57

4.2. Proposed primary use cases 58

4.3. Identification of possible taxable events 60

4.4. Development of transaction categories 66
4.4.1. Origination 66
4.4.2. Original through fiat currency deposits 67
4.4.3. Origination through sales of crypto-asset tokens by originators 67
4.4.3.1. ICO and other market sales 67
4.4.3.2. Investor sales 68
4.4.3.3. Recapitalization (debt auction) 68
4.4.4. Origination through remuneration or incentive 69
4.4.4.1. Developer allocation 69
4.4.4.2. Remuneration and other incentives 69
4.4.4.3. Third-party developers 69
4.4.4.4. Block rewards 70
4.4.5. Origination through fortuitous issuances and receipts 72
4.4.5.1. Airdrop participation 72
4.4.5.2. Hard fork 73
4.4.6. Origination through retention 75
4.4.7. Origination transaction structuring 75
4.4.8. Summary on origination 76
4.4.9. Possible uses by post-origination acquirers 78

4.4.10. Use as a medium of exchange 78
4.4.10.1. Payment solution 78
4.4.10.2. Inter-currency transfer 80
4.4.10.3. Payment of transaction fees 81
4.4.10.4. Payment of counterparty transaction fees 84
4.4.11. Use in involuntary transfers 84
4.4.11.1. Incentivized hacking 84
4.4.11.2. Theft 85
4.4.12. Use in holding 86
4.4.12.1. Minimum account balance 86
4.4.12.2. Network usage and network delegation 86
4.4.12.3. DPoS candidacy and delegation 87
4.4.12.4. Future hard fork and airdrop participation 90
4.4.13. Use in speculation and investment 91
4.4.14. Summary on possible uses by post-acquisition acquirers 91
4.4.15. Extinction 93
4.4.16. Extinction as a medium of exchange 93
4.4.16.1. Transaction and storage fees 93
4.4.16.2. DPoS candidacy 94
4.4.17. Extinction in speculation and investment 94
4.4.17.1. Repurchases 94
4.4.17.2. Surplus auctions (supply reduction) 96
4.4.18. Extinction through redemptions 96
4.4.19. Extinction through involuntary transfers 97
4.4.19.1. Penalties 97
4.4.19.2. Non-existent accounts 98
4.4.19.3. Lost access 98
4.4.20. Summary on extinction 99

4.5. Conclusion 100

Chapter 5 Tax Analysis of Identified Categories 103

5.1. Introduction 103

5.2. Origination by fiat currency deposit 105
5.2.1. Introduction 105
5.2.2. Direct tax consequences for the originator 107
5.2.3. Direct tax consequences for the transferee 107

5.3. Sale of crypto-asset tokens by originators 108
5.3.1. Introduction 108
5.3.2. Rejection of classification as issuance of financial instrument 108
5.3.2.1. Debt instrument 109
5.3.2.2. Equity instrument 109
5.3.2.3. Derivative financial instrument 112
5.3.3. Rejection of classification as royalties – OECD Model Tax Convention 112
5.3.4. Rejection of classification as royalties – UN Model Double Tax Convention 117
5.3.5. Rejection of classification as fees for technical services – UN Model Double Tax Convention 119
5.3.6. Rejection of classification as income from immovable property 122
5.3.7. Classification as business profits 123
5.3.8. Rejection of classification as prepayment for future services 126
5.3.9. Classification as sale of intangible assets 129
5.3.10. Timing of income recognition 129
5.3.10.1. Issue of tokens convertible to native tokens in an ICO 129
5.3.10.2. Issue of tokens incorporating possible future hard fork or airdrop participation 131
5.3.11. Conclusion on income from the sale of crypto-asset tokens by originators 131
5.3.12. Direct tax implications for the originator 132
5.3.13. Direct tax implication for the transferee 132

5.4. Origination as remuneration or incentive 133
5.4.1. Introduction 133
5.4.2. Allocations retained 133
5.4.3. Allocation as remuneration or incentive 134
5.4.3.1. Direct tax consequences for the originator 134
5.4.3.2. Direct tax consequences for the transferee – as employee 136
5.4.3.3. Direct tax consequences for the transferee – as director 138
5.4.3.4. Direct tax consequences for the transferee – as independent provider (OECD Model) 139
5.4.3.5. Direct tax consequences for the transferee – as independent provider (UN Model) 139
5.4.4. Allocation to third-party developers 140

5.4.4.1. Direct tax consequences for the originator 140
5.4.4.2. Direct tax consequences for the transferee 141
5.4.5. Block rewards 142
5.4.5.1. Direct tax implications for the originator 142
5.4.5.2. Direct tax implications for the transferee 142
5.4.5.3. Proof-of-stake transaction validation 146
5.4.5.4. Delegation of participation rights 147

5.5. Fortuitous issuances and receipts 148
5.5.1. Introduction 148
5.5.2. Direct tax consequences for the originator 149
5.5.3. Direct tax consequences for the transferee 149
5.5.3.1. Hard forks 150
5.5.3.2. Airdrops 154
5.5.4. Fortuitous receipts and the determination of cost or basis 155

5.6. Retentions 157
5.6.1. Introduction 157
5.6.2. Direct tax consequences for the originator 157

5.7. Medium of exchange 157
5.7.1. Introduction 157
5.7.2. Tokens originated through fiat currency deposits 158
5.7.2.1. Direct tax consequences for the transferor 158
5.7.2.2. Direct tax consequences for the transferee 162
5.7.3. Tokens originated by all other means 162
5.7.3.1. Direct tax consequences for the transferor 162
5.7.3.2. Direct tax consequences for the transferee 164

5.8. Redemptions 165
5.8.1. Introduction 165
5.8.2. Direct tax consequences for the transferor 165
5.8.3. Direct tax consequences for the transferee 166

5.9. Holding 166
5.9.1. Introduction 166
5.9.2. Direct tax consequences for the holder/transferor 167
5.9.2.1. Network usage rights 167
5.9.2.2. Delegation of network usage rights 168
5.9.2.3. Disposal of tokens 168
5.9.3. Direct tax consequences for the transferee 169

5.10. Speculation and investment 169
5.10.1. Introduction 169
5.10.2. Tokens originated through fiat currency deposits 169
5.10.2.1. Direct tax consequences for the transferor 169
5.10.2.2. Direct tax consequences for the transferee 170
5.10.3. Tokens originated by all other means 170
5.10.3.1. Direct tax consequences for the transferor 170
5.10.3.2. Direct tax consequences for the transferee 171

5.11. Involuntary transfer 171
5.11.1. Introduction 171
5.11.2. Direct tax consequences for the transferor 173
5.11.3. Direct tax consequences for the transferee 173

5.12. Conclusion – direct tax consequences of identified transaction categories 173
5.12.1. Classification in terms of the text of the articles of the model tax conventions 174
5.12.2. Considerations for domestic legislation 177
5.12.3. Diagrammatic representation of proposed outcomes 178

5.13. Testing of proposed outcomes against exemplar 180

5.14. Observations on indirect tax consequences of crypto-asset transactions 183
5.14.1. Introduction 183
5.14.2. Origination by fiat currency deposit 184
5.14.3. Sale of crypto-asset tokens by originators 184
5.14.4. Origination as remuneration or incentive 185
5.14.5. Fortuitous issuances and receipts 186
5.14.6. Retentions 186
5.14.7. Medium of exchange 186
5.14.8. Redemptions 187
5.14.9. Holding 187
5.14.10. Speculation and investment 187
5.14.11. Involuntary transfer 187
5.14.12. Conclusion – indirect tax consequences of identified transaction categories 188

Chapter 6 Tax Outcomes – Comparison with OECD 2020 Report on the Taxation of Virtual Currencies 189

6.1. Introduction 189

6.2. Direct tax – comparison of findings of this book with the OECD report 191

6.3. Indirect tax – comparison of observations of this study to OECD findings 202

6.4. Conclusion of comparison to OECD 2020 report 203

Chapter 7 Jurisdictional Taxing Rights – Current Application and Future Considerations 205

7.1. Current application 205
7.1.1. Introduction 205
7.1.2. Permanent establishment (article 5) 206
7.1.3. Business profits (article 7) 209
7.1.3.1. Negotiable debt instruments 210
7.1.3.2. Sale of intangible assets 210
7.1.3.3. Services rendered – block rewards and transaction fees 212
7.1.3.4. Services rendered – incentive for services outside of an employment relationship 213
7.1.3.5. Letting of property 213
7.1.4. Royalties (article 12) 214
7.1.5. Fees for technical services (article 12A) 215
7.1.6. Capital gains (article 13) 215
7.1.6.1. Negotiable debt instruments 216
7.1.6.2. Sale of intangible assets 216
7.1.6.3. On disposal of tokens held to earn block rewards and transaction fees 216
7.1.6.4. On disposal of tokens held to for network usage rights 217
7.1.7. Independent personal services (article 14) 217
7.1.8. Income from employment (article 15) 217
7.1.9. Directors’ fees (article 16) 218
7.1.10. Other income (article 21) 219
7.1.11. Taxes on capital (article 22) 219

7.2. Future considerations 220
7.2.1. Introduction 220
7.2.2. Pillar One 221
7.2.3. Pillar Two 222
7.2.4. Article 12B of the UN Model Double Tax Convention between Developed and Developing Countries 223
7.2.5. Challenges to tax reforms 225
7.2.5.1. Pseudonymity 225
7.2.5.2. Disaggregation 226
7.2.6. Conclusion 227

Chapter 8 Conclusion 231

8.1. Limitations of this book 231

8.2. Conclusion and recommendations 232

8.3. Areas for future research 239
8.3.1. Tax administration 239
8.3.2. Blockchain technology 241
8.3.3. Recognition of crypto-assets as legal tender 241
8.3.4. Responses to the digitalized economy 241

Appendix A Country-by-Country Analysis 243

Appendix B Analysis of White Papers by Crypto-Asset 289

Appendix C Crypto-Asset Selection and Market Capitalization 335

Appendix D Detailed Transaction Category Mapping Tables 341

References 359

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Soli Deo gloria.

Chapter 1

Introduction

1.1. Crypto-assets, the digitalized economy and the international tax system

Since the advent of Bitcoin in 2009, thousands of crypto-assets based on cryptography, blockchain technology and decentralized networks have emerged. Trading volumes have skyrocketed, and market prices have been extremely volatile. In their exuberant analysis of the future of this technology, Tapscott and Tapscott single out taxation among the regulatory challenges that it presents.[1] Yet while national tax authorities have attempted in varying degrees to respond to this phenomenon, there is "global tax confusion" over the treatment of crypto-assets.[2] As this technology continues to evolve and adoption increases, it will increasingly be important for jurisdictions to formulate and communicate their tax policy responses.[3]

The crypto-asset phenomenon forms part of the larger technological revolution that has given birth to the digitalized economy.[4,5] Attempting to address the challenges that the digitalized economy present to an international tax system, the development of which has remained largely unchanged for over a century[6] has led to "unprecedented levels of international tax coordination around the world".[7] However, although crypto-assets are a significant contributor to financial globalization,[8] the tax consequences of crypto-asset transactions remain at an early stage of development and continue to be determined by individual jurisdictions rather than through a globally coordinated approach. As a result, there is a lack of consensus about what those tax consequences should be.[9] The international tax literature has to date focused primarily on the gains and losses from crypto-asset sales in terms of domestic legislation, indirect tax consequences (particularly in the European Union), and the role of blockchain technology in value creation.[10] While the Organisation for Economic Co-operation and Development (OECD) has engaged with the topic of blockchain technology and has surveyed the current approach within various jurisdictions, it has not yet comprehensively outlined its own position on the tax consequences of crypto-asset transactions. Other international tax bodies have for the most part also yet to establish their own views on tax consequences.[11]

---

[1] D. Tapscott & A. Tapscott, *Blockchain Revolution* (Penguin Random House 2018).

[2] EY, *Why there's global tax confusion about digital currencies*, EY Tax Insights (12 Jun. 2019), available at https://www.ey.com/en_uk/tax/why-there-is-global-tax-confusion-about-digital-currencies (accessed 19 Oct. 2022).

[3] C. Waerzeggers & I. Aw, *Difficulties in Achieving Neutrality and Other Challenges in Taxing Cryptoassets*, in *Cryptoassets: Legal, Regulatory, and Monetary Perspectives* pp. 219-242 (Chris Brummer ed., Oxford University Press 2019).

[4] OECD, *Addressing the Tax Challenges of the Digital Economy, Action 1 – 2015 Final Report* (2015), available at http://www.oecd-ilibrary.org/taxation/addressing-the-tax-challenges-of-the-digital-economy-action-1-2015-final-report_9789264241046-en (accessed 5 Feb. 2018).

[5] While the initial focus was on the "digital economy", it became accepted that a "digital economy" cannot be addressed in isolation, and that digitalization potentially impacts all aspects of the economy. *See* OECD, *Tax Challenges Arising from Digitalisation – Report on Pillar One Blueprint: Inclusive Framework on BEPS* (2020), available at https://doi.org/10.1787/beba0634-en (accessed 19 Nov. 2020).

[6] Id.

1.2. The creation of Bitcoin

Bitcoin was created in 2009 by an anonymous individual or group identified as "Satoshi Nakamoto" and represents the first "broad market based cryptocurrency".[12] The timing of Bitcoin's introduction is significant: it followed shortly after the global economic crisis, at a time when trust in the traditional financial system was at a historic low.[13] The objective of Bitcoin was and remains the facilitation of online payments using cryptographic proof to protect against the possibility of double-spending, thus eliminating the need for a trusted third-party intermediary.[14]

---

[7] Y. Brauner & P. Pistone, *Some Comments on the Attribution of Profits to the Digital Permanent Establishment*, 72 Bull. Intl. Taxn. 4a, p. 1 (2018), Journal Articles & Opinion Pieces IBFD.

[8] J. Carlson, *Cryptocurrency and Capital Controls*, SSRN Electron. J. (2016), available at http://dx.doi.org/10.2139/ssrn.3046954 (accessed 30 May 2022).

[9] Nexia International, *Lack of international tax consensus on cryptocurrency*, Global Insight – October 2018 (2018), available at https://nexia.com/insights/global-insight/lack-of-international-tax-consensus-on-cryptocurrency/ (accessed 17 Oct. 2019); D. Mehboob, *OECD report moves crypto-assets closer to a uniform tax framework*, Int. Tax Rev. (2020).

[10] L. Fjord Kjærsgaard, *Blockchain Technology and the Allocation of Taxing Rights to Payments Related to Initial Coin Offerings*, 48 Intertax 10, pp. 879-903 (2020), available at https://kluwerlawonline.com/JournalArticle/Intertax/48.10/TAXI2020088 (accessed 26 Apr. 2021).

[11] J. Bernstein et al., *Introduction*, in *Taxation of crypto assets* pp. 27-76 (Niklas Schmidt et al. eds., Wolters Kluwer 2020).

[12] M. Iwamura, T. Matsumoto & Y. Kitamura, *Is Bitcoin the Only Cryptocurrency in the Town? Economics of Cryptocurrency and Friedrich A. Hayek*, p. 1 (2014), available at http://ssrn.com/abstract=2405790 (accessed 22 May 2018).

[13] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019); Marsh & McLennan Companies, FireEye & Cir-

Blockchain technology allows Bitcoin users to transact directly with each other without the use of an intermediary.[15] Blockchain refers to the public ledger that is shared between all participants in the blockchain network,[16] which consists of interlinked computer nodes.[17] Each node has access to the entire history of all bitcoins in existence.[18]

Each Bitcoin user has a public and a private cryptographic key. The user's public key is shared, while the private key is kept secret.[19] Users' personal details are not linked to these keys. For this reason, Bitcoin use is often referred to as "pseudonymous".[20] Bitcoins are exchanged by means of the transfer of an electronic file directly between users using these keys, which may be thought of as the addresses from which and to which the file is sent. A useful analogy is that of the public key as the user's bank account number, and the private key as their pin number.[21]

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cle, *Crypto-Assets and Blockchain Technology: On the Brink of Legitimacy?* (2019), available at https://www.marsh.com/in/services/cyber-risk/insights/blockchain-technology-brink-of-legitimacy.html (accessed 1 Jul. 2019).

[14] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

[15] M. Iansiti & K.R. Lakhani, *The Truth About Blockchain*, Harv. Bus. Rev. (2017), available at https://hbr.org/2017/01/the-truth-about-blockchain (accessed 22 May 2018).

[16] G. Hileman & M. Rauchs, *Global Cryptocurrency Benchmarking Study* (2017), available at https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2017-04-20-global-cryptocurrency-benchmarking-study.pdf (accessed 22 May 2018).

[17] A. Bal, *Blockchain, Initial Coin Offerings and Other Developments in the Virtual Currency Market*, 20 Finance and Capital Markets 2 (2018), Journal Articles & Opinion Pieces IBFD.

[18] N. Acheson, *How Bitcoin Mining Works* (2018), available at https://web.archive.org/web/20180224110314/https://www.coindesk.com/information/how-bitcoin-mining-works/ (accessed 27 Feb. 2019); Unocoin, *Bitcoin miners vs Bitcoin nodes*, Unocoin (2018), available at https://blog.unocoin.com/2018/02/06/bitcoin-miners-vs-bitcoin-nodes/ (accessed 26 Jul. 2019).

[19] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019); Marsh & McLennan Companies, FireEye & Circle, *Crypto-Assets and Blockchain Technology: On the Brink of Legitimacy?* (2019), available at https://www.marsh.com/in/services/cyber-risk/insights/blockchain-technology-brink-of-legitimacy.html (accessed 1 Jul. 2019).

[20] M. Iansiti & K.R. Lakhani, *The Truth About Blockchain*, Harv. Bus. Rev. (2017), available at https://hbr.org/2017/01/the-truth-about-blockchain (accessed 22 May 2018).

[21] J. Herbert & M. Stabauer, *Bitcoin & Co: An ontology for categorising cryptocurrencies*, 3 Intl. J. Multidiscip. Bus. Sci., pp. 29-37 (2017), available at https://

A bitcoin is "a chain of digital signatures".[22] When a token is transferred from sender to recipient, the sender adds to the existing chain the recipient's public key, a hash[23] of the previous transaction and the sender's digital signature.[24]

As a decentralized crypto-asset with no central authority, Bitcoin uses a peer-to-peer network of computers to record and validate transactions.[25] Every transaction is broadcast to nodes in the Bitcoin network,[26] which relay transaction information to all other nodes in the network, enforce the Bitcoin protocol, and store a record of the entire Bitcoin blockchain.[27]

For a transaction to be completed, it must be included by the network in a block that is added to the blockchain. A single block has a maximum size (and therefore can contain a maximum number of transactions), and a sender can include a transaction fee in order for the transaction to be prioritized for inclusion in a block.[28]

Bitcoin miners perform the function of creating validated blocks of transactions.[29] Miners download software that allows them to use their comput-

---

www.researchgate.net/publication/328191994_Bitcoin_Co_An_Ontology_for_Categorising_Cryptocurrencies (accessed 7 Jul. 2021).

[22] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* p. 2 (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

[23] "[A] hash function is a mathematical process that takes input data of any size, performs an operation on it, and returns output data of a fixed size." *See* C. Faife, *Bitcoin Hash Functions Explained* (2017), available at https://www.coindesk.com/bitcoin-hash-functions-explained (accessed 25 Jul. 2019).

[24] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

[25] N.A. Plassaras, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*, 14 Chic. J. Intl. Law 1, pp. 377-407 (2013), available at http://chicagounbound.uchicago.edu/cjil/vol14/iss1/12 (accessed 25 Feb. 2019).

[26] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019); B.W. Akins, J.L. Chapman & J.M. Gordon, *A Whole New World: Income Tax Considerations of the Bitcoin Economy*, 12 Pittsburgh Tax Rev. 1, pp. 24-56 (2015), available at http://taxreview.law.pitt.edu/ojs/index.php/taxreview/article/view/32 (accessed 22 Feb. 2018).

[27] N. Acheson, *How Bitcoin Mining Works* (2018), available at https://web.archive.org/web/20180224110314/https://www.coindesk.com/information/how-bitcoin-mining-works/ (accessed 27 Feb. 2019); Unocoin, *Bitcoin miners vs Bitcoin nodes*, Unocoin (2018), available at https://blog.unocoin.com/2018/02/06/bitcoin-miners-vs-bitcoin-nodes/ (accessed 26 Jul. 2019).

[28] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019); Bitcoin Wiki, *Miner fees* (2019), available at https://en.bitcoin.it/wiki/Miner_fees (accessed 25 Jul. 2019).

[29] N. Acheson, *How Bitcoin Mining Works* (2018), available at https://web.archive.org/web/20180224110314/https://www.coindesk.com/information/how-bitcoin-mining-works/ (accessed 27 Feb. 2019).

ing power to try to solve complex mathematical problems or consensus algorithms. The "problem" is based on a hashing algorithm incorporating information on the previous block, the transactions in the block, the time and other inputs.[30] It can only be solved by trial and error and is therefore a function of miners' computing power. The solution is referred to as "proof of work" (PoW) and serves to verify the transactions within the block as valid. The problem should take around ten minutes to solve, which is maintained by adjusting its complexity over time as computing power increases.[31]

While the mathematical problem is difficult to solve, it is easy to verify.[32] The first miner to find the solution broadcasts it to all the nodes in the network, which verify that it is indeed correct.[33] The validated block then gets added to the blockchain,[34] and all nodes update their record of the blockchain accordingly.[35] The process means that transactions are irreversible, as the validated block will itself form part of later blocks that get added to it.[36] As a reward for finding the solution and adding the block, the successful miner receives new bitcoins, as well as any transaction fees included by the sender.[37] The current reward for the successful miner is 6.25 bitcoins, having halved on 11 May 2020. Previous "halving" occurred in 2012 and 2016.[38]

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[30] Bitcoin Wiki, *Block hashing algorithm* (2019), available at https://en.bitcoin.it/wiki/Block_hashing_algorithm (accessed 25 Jul. 2019).

[31] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019); A. Bal, *Blockchain, Initial Coin Offerings and Other Developments in the Virtual Currency Market*, 20 Finance and Capital Markets 2 (2018), Journal Articles & Opinion Pieces IBFD; N. Acheson, *How Bitcoin Mining Works* (2018), available at https://web.archive.org/web/20180224110314/https://www.coindesk.com/information/how-bitcoin-mining-works/ (accessed 27 Feb. 2019).

[32] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019).

[33] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

[34] G. Hileman & M. Rauchs, *Global Cryptocurrency Benchmarking Study* (2017), available at https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2017-04-20-global-cryptocurrency-benchmarking-study.pdf (accessed 22 May 2018). F. Glaser et al., *Bitcoin – Asset or Currency? Revealing Users' Hidden Intentions*, European Conference on Information Systems (2014), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2425247 (accessed 23 May 2018).

[35] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019).

[36] M. Iansiti & K.R. Lakhani, *The Truth About Blockchain*, Harv. Bus. Rev. (2017), available at https://hbr.org/2017/01/the-truth-about-blockchain (accessed 22 May 2018); S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

1.3. The global proliferation of crypto-assets

In the time since its introduction, the growth of Bitcoin has resulted in the creation of a multitude of crypto-assets. Some are offshoots and derivatives of Bitcoin, while others are wholly separate. While some have anonymous or collective origins, others have been created by identified entities. While all make use of blockchain technology, significant differences may exist. Some (for, example, Litecoin or Bitcoin Cash) employ different parameters for block sizes and algorithmic difficulty in order to address the limitations of Bitcoin transaction processing times.[39] Others (for example, NEO or EOS) address the computer processing power and cost associated with mining and producing a proof of work by employing an alternative process called "proof of stake" (PoS, or DPoS in respect of delegated proof-of-stake processes), where the validation process is not completed in competition by the fastest miner, but is allocated to miners for completion according to how much of that crypto-asset they hold at that time.[40] In some instances, the model of a decentralized network is abandoned in favour of centralized recording and validation (such as that employed by Ripple), where the crypto-asset originator also fulfils the function of administrator,[41] representing a somewhat ironic resurrection of the role of trusted intermediary.[42]

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[37] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019).

[38] W. Zhao, *Bitcoin Halving Arrives: Mining Rewards Drop for Third Time in History* (2020), available at https://www.coindesk.com/bitcoin-halving-arrives-mining-rewards-drop-for-third-time-in-history (accessed 15 Dec. 2020).

[39] Litecoin Project, *Litecoin – Open source P2P digital currency* (2020), available at https://litecoin.org/ (accessed 8 Jan. 2020); BitcoinCash, *Bitcoin Cash* (2020), available at https://www.bitcoincash.org/index.html (accessed 8 Jan. 2020).

[40] J. Herbert & M. Stabauer, *Bitcoin & Co: An ontology for categorising cryptocurrencies*, 3 Intl. J. Multidiscip. Bus. Sci., pp. 29-37 (2017), available at https://www.researchgate.net/publication/328191994_Bitcoin_Co_An_Ontology_for_Categorising_Cryptocurrencies (accessed 7 Jul. 2021); Neo, *NEO White Paper* (2020), available at https://docs.neo.org/docs/en-us/basic/whitepaper.html (accessed 21 Aug. 2019); block.one, *EOS.IO Technical White Paper v2* (2018), available at https://github.com/EOSIO/Documentation/blob/master/TechnicalWhitePaper.md (accessed 17 Jan. 2020).

[41] European Central Bank, *Virtual currency schemes – a further analysis* (2015), available at www.ecb.europa.eu (accessed 23 Jul. 2019).

[42] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019).

The use cases of crypto-assets have also expanded beyond the payment facilitation use case of Bitcoin. These include the facilitation of global currency exchange (Ripple), smart contracts (Ethereum), social media (Steemit) or of other applications (EOS).[43] While sceptics argue that the potential use cases may be exaggerated, "the trends toward decentralization and P2P [peer-to-peer] transactions are unmistakable".[44]

The manner in which the number of tokens in a crypto-asset ecosystem is increased also varies. While many are issued to reward transaction validation (Bitcoin), others are issued to reward development teams (EOS), in return for the production of creative content (Steemit) or even the production of solar energy (SolarCoin).[45] Some are sold to fund initial development in so-called "initial coin offerings" (ICOs) (Ethereum) or are held for sale by their creators over time (Ripple).[46] In some cases, the tokens of newly-created crypto-assets are given to holders of existing crypto-assets at the point that the new crypto-asset splits or "hard forks" from its parent (Bitcoin Cash).[47] While many crypto-assets have no inherent value (Bitcoin), others are pegged or linked directly to the price of fiat currency (USD Tether) or commodities (DigixDAO).[48] In 2021, the Bahamas became the first jurisdiction to launch a central bank digital currency (CBDC). Many other central banks, including those of the European Union and China, are actively developing or testing CBDCs.[49]

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[43] Ripple, *Ripple – One Frictionless Experience To Send Money Globally* (2019), available at https://ripple.com/ (accessed 25 Feb. 2019); V. Buterin, *Ethereum White Paper*, Ethereum (2014), available at https://ethereum.org/669c9e2e2027310b6b3cdce6e1c52962/Ethereum_Whitepaper_-_Buterin_2014.pdf (accessed 21 Aug. 2019); block.one, *EOS.IO Technical White Paper v2* (2018), available at https://github.com/EOSIO/Documentation/blob/master/TechnicalWhitePaper.md (accessed 17 Jan. 2020); Steem, *Steem white paper* (2017), available at https://steem.io/steem-whitepaper.pdf (accessed 29 May 2018).

[44] World Bank, *Cryptocurrencies and Blockchain Europe and Central Asia Economic Update* p. 23 (2018), available at https://openknowledge.worldbank.org/handle/10986/29763 (accessed 1 Jul. 2019).

[45] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019); block.one, *EOS.IO Technical White Paper v2* (2018), available at https://github.com/EOSIO/Documentation/blob/master/TechnicalWhitePaper.md (accessed 17 Jan. 2020); Steem, *Steem white paper* (2017), available at https://steem.io/steem-whitepaper.pdf (accessed 29 May 2018); SolarCoin (2020), available at https://solarcoin.org/ (accessed 15 Dec. 2020).

[46] V. Buterin, *Ethereum White Paper*, Ethereum (2014), available at https://ethereum.org/669c9e2e2027310b6b3cdce6e1c52962/Ethereum_Whitepaper_-_Buterin_2014.pdf (accessed 21 Aug. 2019); Ripple, *XRP Ledger Concepts*, XRP Ledger Project (2019), available at https://xrpl.org/concepts.html (accessed 14 Oct. 2019).

[47] N. Webb, *A Fork in the Blockchain: Income Tax and the Bitcoin/Bitcoin Cash Hard Fork*, 19 North Carolina J. Law Technol. 4, pp. 283-311 (2018), available at https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=1361&context=ncjolt (accessed 25 Mar. 2020).

[48] S. Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2009), available at www.bitcoin.org (accessed 20 Mar. 2019); DIGIX, *DGX the finest gold tokenised* (2019), available at https://digix.global/dgx/ (accessed 8 Nov. 2019); Tether Limited,

In early 2018, the market capitalization of all crypto-assets increased to "a tenth of the value of all gold in the world".[50] This was, however, as measured shortly before a crash in crypto-asset prices that was more pronounced in price fluctuation than the Dot-com bubble of 2000.[51] Nonetheless, in the same year, USD 1 trillion in Bitcoin transactions was processed.[52]

The market capitalization of over 2,300 crypto-assets on 21 August 2019 was USD 267 billion.[53] Although still priced below its 2018 peak at that time, Bitcoin had enjoyed significant price increases in 2019, and represented 68% of the total market capitalization on this date.[54] In the same year, the ECB Crypto-Assets Task Force estimated that the crypto-asset

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Tether: Fiat currencies on the Bitcoin blockchain (2016), available at https://tether.to/wp-content/uploads/2016/06/TetherWhitePaper.pdf (accessed 21 Aug. 2019).

[49] R. Auer, G. Cornelli & J. Frost, *Rise of the central bank digital currencies: drivers, approaches and technologies* (2020), available at https://www.bis.org/publ/work880.pdf (accessed 25 Mar 2021); Bank for International Settlements, *Annual Economic Report 2021: III. CBDCs: an opportunity for the monetary system* (2021), available at https://www.bis.org/publ/arpdf/ar2021e3.htm (accessed 16 Jul. 2021); PwC, *PwC CBDC global index 1st Edition* (2021), available at https://www.pwc.com/gx/en/industries/financial-services/assets/pwc-cbdc-global-index-1st-edition-april-2021.pdf (accessed 16 Jul. 2021); F. Panetta, *Preparing for the euro's digital future*, The ECB Blog (2021), available at https://www.ecb.europa.eu/press/blog/date/2021/html/ecb.blog210714~6bfc156386.en.html (accessed 16 Jul. 2021).

[50] Marsh & McLennan Companies, FireEye & Circle, *Crypto-Assets and Blockchain Technology: On the Brink of Legitimacy?* p. 5 (2019) available at https://www.marsh.com/in/services/cyber-risk/insights/blockchain-technology-brink-of-legitimacy.html (accessed 1 Jul. 2019).

[51] ECB Crypto-Assets Task Force, *Crypto-Assets: Implications for financial stability, monetary policy, and payments and market infrastructures* (2019), available at https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op223~3ce14e986c.en.pdf (accessed 24 Jul. 2019).

[52] Marsh & McLennan Companies, FireEye & Circle, *Crypto-Assets and Blockchain Technology: On the Brink of Legitimacy?* (2019), available at https://www.marsh.com/in/services/cyber-risk/insights/blockchain-technology-brink-of-legitimacy.html (accessed 1 Jul. 2019).

[53] This was the date on which the sample was selected for the purposes of this study. In the intervening period the crypto-asset market has continued to grow dramatically. At 30 June 2021, crypto-assets in issue had a combined market capitalization of USD 1.42 trillion. Bitcoin represented 46% of this amount.

[54] CoinMarketCap, *CoinMarketCap* (2019), available at https://coinmarketcap.com (accessed 26 Jul. 2019).

market is equivalent to 1.2% of the M1 or 0.8% of the M3 Euro-area money supply.[55]

1.4. Overview of this book

The central proposition of this book is that the international tax system would be well-served by a globally coordinated response to the taxation of crypto-asset transactions based on a systematic analysis of crypto-asset transactions, taking into account the individual nature of different types of crypto-assets and the transactions they might facilitate. This would contribute not only to the establishment of how the allocation of jurisdictional taxing rights over those transactions should be determined but might also serve as a common point of reference for individual jurisdictions as they formulate or further develop their domestic responses.

This book proceeds as follows. Chapter 2 presents the research objective, research paradigm and methodology. Chapter 3 provides an overview of the state of the taxation of crypto-asset transactions as represented by the published responses of individual jurisdictions. Chapter 4 presents the outcomes of an analysis of selected crypto-asset white papers.[56] It begins with the identification of transactions representing possible taxable events. It then uses these in developing transaction categories, where each transaction category represents those transactions that are substantially similar in nature to all other transactions within that category, and distinct from every other transaction category.

Chapter 5 then seeks to establish the direct tax consequences of each transaction category with specific reference to the text of the articles of the model tax conventions. The chapter also presents limited observations on indirect tax consequences. Chapter 6 compares the direct tax consequences proposed in the preceding chapter as well as the observations on indirect tax consequences to the findings of the 2020 OECD research on current practice in various jurisdictions as reported in *Taxing Virtual Currencies: An Overview of Tax Treatments and Emerging Tax Policy Issues*.

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[55] ECB Crypto-Assets Task Force, *Crypto-Assets: Implications for financial stability, monetary policy, and payments and market infrastructures* (2019), available at https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op223~3ce14e986c.en.pdf (accessed 24 Jul. 2019).

[56] The sample covers 93.6% of crypto-asset tokens by market capitalization on 29 August 2019. This is discussed further in sec. 2.1., while the sample is presented in Table 4.1.

Chapter 7 considers the current allocation of taxing rights arising from crypto-asset transactions based on their proposed classification with reference to the text of the articles of the model tax conventions and explores the challenges that such allocations may present to the existing tax system. It then considers how the jurisdictional taxing rights over such crypto-assets might be impacted by either the OECD's Pillar One and Two or the United Nations' (UN) Article 12B proposals as at 30 June 2021.

Chapter 8 firstly reminds the reader of the limitations to the present book before concluding, presenting the significant recommendations of the book and suggesting areas for future research.

Chapter 2

Research Objective and Methodology

2.1. Research objective

The objective of this book is to determine the taxable events arising from the range of transactions identified within a sample of the 25 largest crypto-asset tokens by market capitalization at 21 August 2019, which represents 93.6% of the total market capitalization at that date, and the appropriate classification of the income arising from those transactions within the parameters of the text of the articles of the model tax conventions. This book seeks to establish an explicit basis for the allocation of taxing rights over crypto-asset transactions within the context of the international tax system, as well as providing a point of reference for individual jurisdictions to support the development of their comprehensive domestic responses to crypto-asset transactions, and to promote greater consistency in the scope and outcomes of those responses.

The book focuses primarily on direct taxation, although some brief observations on indirect taxation will be drawn from the analysis performed.

The development of a globally coordinated approach to the taxation of crypto-asset transactions would continue the emerging trend of global cooperation and coordination in tax policymaking. This trend is evident both in the OECD's Base Erosion and Profit Shifting (BEPS) Project and in current attempts to formulate a globally coordinated approach to the taxation of the digitalized economy.[57] The outcomes of this book will also contribute to the wider global discussion on appropriate responses to the taxation of the digitalized economy, which to date have given relatively little attention to crypto-asset transactions,[58] which are likely to form an increasingly significant contributor to the digitalized economy in the future.

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[57] OECD, *Public consultation document: Secretariat Proposal for a "Unified Approach" under Pillar One* (2019), available at http://www.oecd.org/tax/beps/public-consultation-document-secretariat-proposal-unified-approach-pillar-one.pdf (accessed 28 Nov. 2019); OECD, *Tax Challenges Arising from Digitalisation – Report on Pillar One Blueprint: Inclusive Framework on BEPS* (2020), available at https://doi.org/10.1787/beba0634-en (accessed 19 Nov. 2020); OECD, *Tax Challenges Arising from Digitalisation – Report on Pillar Two Blueprint: Inclusive Framework on BEPS* (2020), available at https://doi.org/10.1787/abb4c3d1-en (accessed 19 Nov. 2020); OECD, *Addressing the Tax Challenges of the Digitalisation of the Economy – Policy Note* (2019), available at http://www.oecd.org/tax/beps/policy-note-beps-inclusive-framework-addressing-tax-challenges-digitalisation.pdf (accessed 1 Apr. 2019).

The significant contributions of this book are intended to be:

- the identification of the possible taxable events arising from selected crypto-assets (chapter 4);
- the development of a limited number of transaction categories from those events that reflect their distinct and similar characteristics, and which may be used to inform the scope of a comprehensive response to the taxation of crypto-asset transactions (chapter 4);
- the determination of the direct tax consequences arising from each transaction category, and its classification within the text of the articles of the model tax conventions (chapter 5);
- the identification of challenges to the determination of direct tax consequences or the classification thereof that may need to be addressed either within the model conventions or domestic legislation (chapter 5);
- the determination of the current allocation of jurisdictional taxing rights that arise from the proposed classifications within the text of the articles of the model tax conventions and the identification of any challenges to existing tax bases that may result from the interaction between those classifications and the nature of the crypto-asset transaction categories developed (chapter 7); and
- consideration of how the current jurisdictional taxing rights over crypto-asset transactions as determined by this book might be impacted by responses within the international tax system to the digitalized economy in the form of either the OECD's Pillar One and Pillar Two or the UN's article 12B proposals as at 30 June 2021 (chapter 7).

2.2. Research paradigm

2.2.1. The legal research paradigm

This book seeks to both critique and contribute to international and domestic tax responses to crypto-asset transactions. It is therefore an exercise in legal research. Legal research may be viewed either as positioned some-where on the continuum between the positivist and interpretivist research paradigms, or alternatively as a distinct paradigm in its own right,[59] and may be divided broadly into doctrinal and non-doctrinal research.[60]

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[58] L. Fjord Kjærsgaard, *Blockchain Technology and the Allocation of Taxing Rights to Payments Related to Initial Coin Offerings*, 48 Intertax 10, pp. 879-903 (2020), available at https://kluwerlawonline.com/JournalArticle/Intertax/48.10/TAXI2020088 (accessed 26 Apr. 2021).

This book engages in elements of both doctrinal and non-doctrinal research (in the form of reform-oriented research).

2.2.1.1. Doctrinal research and comparative analysis

Doctrinal research is the dominant and "most accepted methodology in the discipline of law" that presents itself in most other forms of legal research,[61] and is sometimes referred to as "black-letter law".[62] It follows a "systematic process of identifying, analysing, organising and synthesizing statutes, judicial decisions and commentary".[63] Although closely associated with positivism, doctrine must be evaluated on the basis of its source, being legislation or case law, rather than merely being observed as occurring in nature.[64] There is an expectation that current doctrinal research will incorporate some element of comparative analysis,[65] which may involve comparison of legislation between jurisdictions or over time.[66]

This book employs comparative analysis in drawing conclusions as to the sufficiency in breadth and depth of engagement with the taxation of crypto-asset transactions among the jurisdictions considered and in developing overall conclusions as to the current state of the approach to the taxation of crypto-asset transactions in totality. Doctrinal analysis is then employed to determine the tax consequences of the transaction categories developed and the classification thereof within the text of the articles of the model tax conventions.

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[59] M. McKerchar, *Philosophical Paradigms, Inquiry Strategies and Knowledge Claims: Applying the Principles of Research Design and Conduct to Taxation*, 6 eJournal Tax Res. 1, pp. 5-22 (2008), available at http://www.austlii.edu.au/au/journals/eJlTaxR/2008/1.html (accessed 2 Jan. 2019).

[60] T. Hutchinson & N. Duncan, *Defining and Describing What We Do: Doctrinal Legal Research*, 17 Deakin Law Rev. 1, pp. 83-119 (2012).

[61] Id., at p. 102.

[62] S. Taekema, *Theoretical and Normative Frameworks for Legal Research: Putting Theory into Practice*, Law Method, pp. 1-17 (2018), available at http://www.bjutijdschriften.nl/doi/10.5553/REM/.000031 (accessed 13 Sep. 2019).

[63] M. McKerchar, *Philosophical Paradigms, Inquiry Strategies and Knowledge Claims: Applying the Principles of Research Design and Conduct to Taxation*, 6 eJournal Tax Res. 1, pp. 18-19 (2008).

[64] T. Hutchinson & N. Duncan, *Defining and Describing What We Do: Doctrinal Legal Research*, 17 Deakin Law Rev., pp. 83-119 (2012).

[65] T. Hutchinson, *The Doctrinal Method: Incorporating Interdisciplinary Methods in Reforming the Law*, 8 Erasmus Law Rev. 3., pp. 130-138 (2015), available at http://www.elevenjournals.com/doi/10.5553/ELR.000055 (accessed 14 Jun. 2018).

[66] M. Minow, *Archetypal Legal Scholarship: A Field Guide*, 63 J. Legal Educ. 1, pp. 65-69 (2013), available at https://jle.aals.org/home/vol63/iss1/4 (accessed 14 Jun. 2018).

2.2.1.2. Reform-oriented research

While doctrinal research focuses on analysing the current law, reform-oriented research aims to effect changes in the law[67] and is sometimes referred to as "*de lege ferenda*" (meaning "the future law" and implying "the law as it should be").[68]

This book engages in reform-oriented research to the extent that it proposes specific additions or amendments to either the model tax conventions and their commentaries or to domestic legislation in response to the analysis performed, as well as in using the outcomes of the analysis to advocate for a globally coordinated approach to the taxation of crypto-asset transactions.

2.2.2. Normative frameworks applied

Underlying every research undertaking is a theoretical framework that provides the "underlying structure, the scaffolding or frame" for the book.[69] Taekema argues that what distinguishes the legal research paradigm is its use of normative frameworks. A normative framework provides the basis upon which solutions to the problem posed must be evaluated.[70]

This book employs two normative frameworks in seeking to establish the direct tax consequences of crypto-asset transactions within the context of the international tax system. The first normative framework employed is the text of the articles of the model tax conventions, being the OECD Model Tax Convention (OECD Model) and the UN Model Double Tax

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[67] M. McKerchar, *Philosophical Paradigms, Inquiry Strategies and Knowledge Claims: Applying the Principles of Research Design and Conduct to Taxation*, 6 eJournal Tax Res. 1, pp. 5-22 (2008), available at http://www.austlii.edu.au/au/journals/eJlTaxR/2008/1.html (accessed 2 Jan. 2019).

[68] A. Bal, *Taxation of virtual currency* (2014), available at https://openaccess.leidenuniv.nl/handle/1887/29963 (accessed 13 Jun. 2018).

[69] S.B. Merriam & E.J. Tisdell, *Qualitative Research: A Guide to Design and Implementation* p. 85 (4th ed., Jossey-Bass 2016).

[70] S. Taekema, *Theoretical and Normative Frameworks for Legal Research: Putting Theory into Practice*, Law and Method, pp. 1-17 (2018), available at http://www.bjutijdschriften.nl/doi/10.5553/REM/.000031 (accessed 13 Sep. 2019).

Convention between Developed and Developing Countries (UN Model), and the second is the principles of good tax design.

2.2.2.1. The OECD Model

The main purpose of the OECD Model, most recently updated in 2017, is to provide a basis for resolving issues of double taxation in a consistent manner, through the alignment of tax treaties by contracting states with a standard model, and the interpretation of those treaties in accordance with the OECD Commentary thereto. While contracting states are free to negotiate the terms of each treaty concluded, the model and main provisions of the OECD Model have been followed in most cases by OECD member countries, and have significant influence over the treaties of member and non-member countries, as well as over those between non-member countries. It has also served as the basis for the UN Model. The OECD Commentary in turn plays a significant role in the interpretation of treaties and is given "great weight" by those responsible for doing so.[71]

Although the OECD Model is "of special importance in the development of international fiscal law",[72] it is not, however, law in and of itself. It is only the articles of a particular signed treaty, which may or may not adopt the articles of the OECD Model, that are binding, and then only in respect of cross-border transactions involving those two contracting states. The degree of authority of any interpretation in the OECD Commentary depends on the extent to which it relates to provisions of the OECD Model that were incorporated in a treaty, and whether the current interpretation reflected in the OECD Commentary was expressed at the time the treaty was entered into.[73] While some debate exists as to whether the use of the OECD Commentary is progressing towards a position of "hard law", at present it remains a non-binding guide to interpretation or "soft law".[74]

Notwithstanding these caveats to overreach, the OECD Model occupies a unique and preeminent position within international taxation, and alignment with its basis of classification may therefore be instrumental in fur-

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[71] OECD, *Model Tax Convention on Income and on Capital 2017 (Full Version)* (2019), available at http://dx.doi.org/10.1787/g2g972ee-en (accessed Jun 4, 2020).

[72] Id., at I-11.

[73] M. Lang & F. Brugger, *The Role of the OECD Commentary in Tax Treaty Interpretation*, 23 Austrl. Tax Forum (2008).

[74] C. West, *References to the OECD Commentaries in Tax Treaties: A Steady March from "Soft" Law to "Hard" Law?*, 9 W. Tax J. 1 (2017), Journal Articles & Opinion Pieces IBFD.

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