

Initial Coin Offerings, Corporate Finance and Financial Regulation

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Abstract

Initial Coin Offerings (ICOs) have grown substantially in recent years. They involve issuing coins that are recorded on a blockchain. These can be used to purchase the service or good that the firm they finance produces. The coins can be exchanged for currency on cryptocurrency exchanges. Although many ICOs are fraudulent, most studies find positive average and median returns. Theoretical analyses suggest they can have several advantages compared to Initial Public Offerings (IPOs). They are regulated in widely differing ways with the UK, Switzerland and Singapore having regimes that make them easier to undertake than other countries.

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Introduction

Initial Coin Offerings (ICOs) where firm promoters issue electronic “coins” recorded on a blockchain that can be used to buy goods and services, are a rapidly growing form of corporate finance. Table 1 shows the amount raised and the number of ICOs that occurred from 2014-2018. It can be seen that they were almost unknown in 2014 and 2015 with 2 and 3 ICOs, respectively, and the amounts raised being a few million dollars. 2016 was a transition year with 29 ICOs and \$90 million raised. In 2017, ICOs took off with 875 issues and \$6.227 billion raised and in 2018 there were 1,253 issues and \$7.812 billion.

Table 1
ICOs from 2014-18

| Year | Number of ICOs | Amount Raised (millions \$) |
|-------------|-----------------------|------------------------------------|
| 2014 | 2 | 16 |
| 2015 | 3 | 6 |
| 2016 | 29 | 90 |
| 2017 | 875 | 6,227 |
| 2018 | 1,253 | 7,812 |

Source: ICODATA.IO: <https://www.icodata.io/stats/2018>

Although there are ICOs in many countries, some countries have significantly more than others. Table 2 shows the top 6 countries out of 18 with at least 12 for ICOs in 2017 and the first quarter of 2018 (from Huang et al. (2018)). The United States and Russia are the largest with the United Kingdom, Singapore and Switzerland next. While the first two are large countries, the next three are not, particularly Singapore and Switzerland. It is argued below that regulation plays a significant role in this distribution and the UK, Singapore, and Switzerland are particularly accommodative of this kind of financial technology.

There are a whole range of interesting issues associated with ICOs. We start by considering the typical sequence of events in an ICO. An important role is played by the

Table 2
The Geography of ICOs

| Country | Number of ICOs | % ICOs |
|----------------|----------------|--------|
| United States | 178 | 19.5 |
| Russia | 111 | 12.1 |
| United Kingdom | 80 | 8.7 |
| Singapore | 75 | 8.2 |
| Switzerland | 46 | 5.0 |
| Canada | 29 | 3.2 |

Source: Adapted from Table 1 in Huang et al. (2018).

information that is released in ICOs and how this helps to protect ICO investors. While ICOs have a number of advantages, they also have a number of disadvantages that are discussed.

An example of an ICO called Streamr is considered next to illustrate how these offerings often work. Streamr is a platform that allows data to be bought and sold using coins called DATAcoins that are special to the firm. These were issued in the initial offering to raise money to fund the firm and who owns them as they change hands are recorded on a blockchain. A proportion is held by those launching the firm to provide incentives for them to actually construct the firm so that the coins can be used to buy and sell the data. It is an interesting example because it could evolve into a new organizational form, namely a Decentralized Autonomous Organization or DAO. This kind of organization is essentially a computer program that is held on many computers so that it is decentralized. It can also be fully autonomous with no human intervention. As a result, equity is not needed.

There is a growing literature on the returns to investing in ICOs that is documented. While many are scams, many are not and overall returns appear to be positive. There is also a literature that considers the determinants of success of ICOs and this is discussed.

A number of theoretical models of ICOs have been developed. These usually argue that equity is a superior funding mechanism but we shall suggest this result depends on a number of assumptions of the models.

A key question that has come up in many countries is how ICOs should be regulated. We consider various models that are being used and argue that the UK, Singapore and Switzerland have developed the best form of regulation. However, there is room for improvement if the full benefits of ICOs for the economy are to be obtained. Finally, there are concluding remarks.

Typical Sequence of Events with ICOs

Since in many places ICOs are unregulated, they are done in a number of ways. Here we consider a typical sequence of events.

1. The promoters making the ICO issue a “White Paper” – these take many different forms but usually describe the nature of the technology being funded and the uses the technology can be put to.
2. Possible investors then have the opportunity to ask the promoters questions about the technology and the business that is being founded.
3. An initial sale of coins is made and the promoters use the funds to implement the project. The promoters keep a proportion of the coins so that they have an incentive to complete the project, in which case the coins will have value.
4. Coins can be used on the platform to buy and sell the service or good the firm produces. These transactions are recorded on a blockchain.

5. The coins can be bought and sold for conventional currencies on cryptocurrency exchanges.

Information Released and Protection of Investors in ICOs compared to IPOs

Cohney, Hoffman, Sklaroff and Wishnick (2019) compare the information released in ICOs and protection of investors through computer code or what are known as “smart contracts” with traditional legal mechanisms in Initial Public Offerings (IPOs). They consider the top fifty ICOs in terms of funds raised in 2017 and collect the white papers and other available information. Their focus is on three issues regarding promises made in the documentation and whether they were coded in the smart contracts.

1. Did the promoters promise to restrict coin supply?
2. Was the vesting of coins to promoters to provide incentives as promised?
3. Did promoters retain the right to modify the code and was this disclosed?

The authors found that the ICO code and ICO disclosures often do not match. The code often fails to deliver key investor protections such as limiting the number of coins and providing the incentives to complete the project as promised. Also, the code often allows the promoters considerable ability to change the terms of engagement in ways that were not disclosed. Overall, the degree of protection is considerably less than in IPOs.

Advantages and Disadvantages of ICOs

Kaal (2018) points to several advantages of ICOs compared to conventional ways of raising capital.

1. ICOs enable borderless online sales with very few costs by enabling promoters to bypass the usual legal and jurisdictional hurdles and directly selling to a worldwide pool of investors

2. They provide excellent liquidity because global cryptocurrency exchanges provide continuous access to trading ICO tokens from the early stages of the business
3. ICOs provide liquidity to investors faster than other forms of capital formation such as venture capital, because investors can avoid the long and complex processes leading up to an IPO or sale and can simply sell their coins on an exchange

The main disadvantage of ICOs is the lack of regulatory oversight and legal recourse to the promoters as discussed in Cohney et al. (2019).

Example of an ICO – Streamr

An example of an ICO is described to illustrate some of the main features. Streamr is a platform that is designed to allow agents to buy and sell continuous streams of data for various applications. For instance, an asset manager might want to buy data on stock market prices, macroeconomic variables, and so on to drive its asset allocation model. Sellers of this data will find Streamr a useful platform to connect with such buyers.

Full details of the firm and in particular the White Paper can be found at <https://token.streamr.com/>. Table 3 contains an extract from this. The ICO raised 30 million Swiss Francs. The coins that were issued are called DATAcoins and there are a fixed number of these. DATAcoins are not mined but can be earned by selling data or can be bought or sold at a cryptocurrency exchange. The following link gives access to a page with details of the current price of DATAcoins and various other information such as the total market capitalization of the company. <https://coinmarketcap.com/currencies/streamr-datacoin/>

New Organizational Forms: The Decentralized Autonomous Organization (DAO)

Streamr provides an example of a new type of organisational form. In the long run when it is fully completed, it has the potential to run autonomously without any human intervention.

The programs that underlie the platform will be housed on many computers in many diverse

Table 3

The White Paper for Streamr

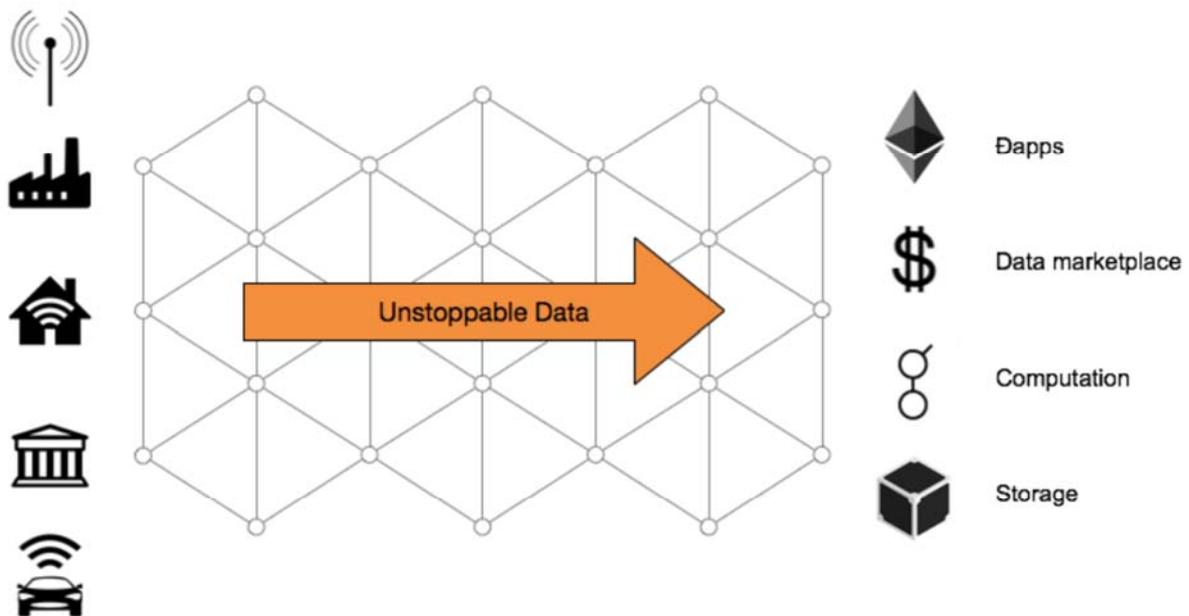
Unstoppable Data for Unstoppable Apps: DATAcoin by Streamr

streamr

July 25th, 2017

Version 1.0

This whitepaper is for information only and does not constitute an offer or any kind of investment advice. Any element of this whitepaper may undergo significant changes as the project further develops.



Streamr vision

Streamr delivers unstoppable data to unstoppable applications. It is the real-time data backbone of the global supercomputer. It is a decentralized network for scalable, low-latency, untamperable data delivery and persistence, operated by the DATAcoin token. Anyone — or anything — can publish new data to data streams, and others can subscribe to these streams to power Dapps, smart contracts, microservices, and intelligent data pipelines.

To incentivize user participation in the network, there's a built-in mechanism for data monetization. Valuable data from security exchanges, connected devices, IoT sensors, and social media can be offered to companies, developers, and private citizens. Machines can autonomously sell their data, get paid, and purchase the data they require. A global market for real-time data emerges, with built-in data provenance, encryption, and access control.

Alongside the decentralized data network and marketplace, the full Streamr stack includes a powerful analytics engine and a UI for rapid development of real-time Dapps. Data streams, smart contracts, and decentralized computing resources can be interconnected in a low-code environment using high-level building blocks. Streamr will be the easiest place to create real-time, data-driven, and trustworthy blockchain applications.

A revolution is taking place where centralized cloud services are one by one being superseded by tokenized, decentralized solutions. Golem, for example, replaces Azure Virtual Machine, and IPFS replaces Azure Blob Storage. Streamr is proud to join the revolution by providing a decentralized solution to messaging and event processing, replacing platforms such as Azure EventHub and Azure Stream Analytics.

Source: The Streamr White Paper that can be found at <https://token.streamr.com/>.

places. If one or a few fail then this will not lead to the service Streamr provides being lost.

This decentralised structure and the fully automatic nature of the platform means that it is not necessary to have equity and governance structures in the way that traditional firms do. This feature becomes a key characteristic in terms of potential advantages of ICOs. We will return to this issue when we discuss theories of ICOs below. Karjalainen (2020) contains a full discussion of governance paradigms for firms such as Streamr.

Returns on ICOs

One of the problems with ICOs is that many are fraudulent. It is possible for the promoters to simply take the money raised in the ICO and disappear without creating the firm that allows the coins to be used. One of the important issues with ICOs is whether this fraud possibility means that the returns are negative or whether the non-fraudulent ones earn sufficient positive returns to offset the scams. There are a number of papers that consider the returns on a sample of ICOs. They find widely differing results mainly because the samples used are quite different.

Benedetti and Kostovetsky (2018) create a dataset with 2,390 completed ICOs that are mostly executed between the start of 2017 and the end of April 2018 with a few being earlier. They find that there is a 179% average return from the ICO price to the first day's

opening market price on a cryptocurrency exchange that on average occurred 16 days later. The authors suggest ICOs that don't list within 60 days can be interpreted as fraudulent. If they are assigned a return of -100%, the average return falls to 82%. During the first 30 days of trading, the average buy and hold returns are 48%.

A study by Hu, Parlour and Rajan (2019) uses a dataset consisting of 64 of the largest ICOs by market capitalization based on white papers that were available as August 2017. In their sample, the median return on tokens that were purchased at the average ICO offering price and the end of the first day was 115%. At the end of the first month, the median increase was a further 29%. They create a sample that is 25% larger by adding firms that they do not have ICO prices for but do have price data for secondary trading on cryptocurrency exchanges. With these extra observations, the median returns from the end of the first day until the end of the first month are -16.1%. However, the average return is 46.3% because of some large positive returns in the extended sample.

In a series of empirical studies of ICOs, Momtaz (2019; 2020) finds that the price rises by 8.2% on average on the first day. Despite this average increase, the price falls on the first day of trading in 40% of cases. Momtaz (2019) investigates long term returns. Over the three years the average return is 15% while the median return is 3%.

Fahlenbrach and Frattaroli (2019) consider a hand-collected sample of 306 ICOs that successfully raised money between March 2016 and March 2018. On average the firms have 4,700 ICO investors. The median investor invests \$1,200 and usually sells before the product is developed so the liquidity of ICOs seems to be valuable to them. The average return using weightings based on the initial amounts raised over 270 days in their sample is 104.8% but most of this is due to the rise in the price of cryptocurrencies generally. They therefore consider the excess return relative to the Ethereum cryptocurrency. Using equal weights, the excess return relative to Ethereum was -1.5% but with initial value weights it was +37.0%.

The point that Fahlenbrach and Frattaroli (2019) make that returns on ICOs can be related to the price changes of cryptocurrencies is borne out by Allen, Fatas and di Mauro (2019). They investigate the correlation between the returns on the 50 largest ICOs and Bitcoin and Ethereum. Correlations are positive but low while Bitcoin and Ethereum were becoming established and their prices were rising. When their prices fell dramatically in late 2017 and early 2018 the correlations increase and reach very high level.

Overall, despite the many scams and unsuccessful projects that lead to large numbers of firms with negative coin returns, there is substantial evidence in the literature of a positive average and, to a lesser extent, positive median returns over a multitude of holding periods. Thus, this type of financing does appear to have some social value and may well survive in the long run.

Determinants of Success of ICOs

One of the issues that has received some attention in the literature is what is needed to ensure an ICO is a success. An early paper investigating these issues is Adhami, Giudici, and Martinozzi (2018). They consider 253 ICOs from the beginning of 2014 until August 2017. They find that the probability of an ICO's success in terms of raising funds is increased if the source code the enterprise is based on is available, and if there is a presale of tokens that allows the purchase of the firm's output.

Howell, Niessner, and Yermack (2019) contains a thorough investigation of 1,520 ICOs that are listed on the TokenData website as of April 2018. They focus on 451 offerings where the coins subsequently trade on secondary exchanges for at least 90 days. Among these, firms are more successful in terms of avoiding failure and increasing employment if they issue a white paper that includes a budget, there is a vesting period for the tokens owned by the top management, and when the latter have venture capital, entrepreneurial and computer science experience. While Howell et al. find that success is improved by allocating

some tokens to an incentive pool, Roosenboom, van der Kolk, and de Jong (2020) find that bonus schemes hurt success. Otherwise their results are similar except that the latter also additionally show higher quality ratings by experts and having a pre-ICO GitHub repository are significant factors for success. Finally, Bourveau, De George, Ellahie and Macciocchi (2019) stress the stress the importance of the role of information intermediaries in the success of ICOs.

Theoretical Analysis of ICOs

As the previous sections have outlined, ICOs have been used to fund a significant number of entrepreneurial ventures. They also appear to have positive returns initially. How can these observations be explained? A number of theoretical studies have investigated the circumstances where token-based finance might be superior to traditional Initial Public Offerings (IPOs).

An early contribution is Catalini and Gans (2019). They develop a partial equilibrium model where an entrepreneur is raising funds for an innovative venture through an ICO and compare it with raising funds through a traditional equity offering. The products of the firm are paid for with the coin that is issued. Their main result is that issuing equity is superior to issuing coins because it can monetize the future equity return stream and so raise more money. This result suggests that ICOs will be a fleeting phenomenon that will soon die out. However, they have not done so yet.

Malinova and Park (2018) start by developing a model where a simple token structure is not as good as equity. However, an optimal token contract that combines pre-selling output with the sharing of marginal revenue is equivalent to equity. Finally, they show that with entrepreneurial moral hazard tokens can finance more ventures than equity. Li and Mann (2018) adopt a different approach to show that tokens can be superior to equity. They focus on firms that develop peer-to-peer platforms. Their main result is to show that selling tokens

before the platform is operating can overcome subsequent network effects. They argue their model is consistent with a number of empirically observed patterns associated with ICOs. Asymmetric information and agency problems are the focus of Chod and Lyandres (2019) when comparing equity and tokens. They show that tokens can be a superior form of finance for firms providing information goods or services, for those where entrepreneurial effort is important and those with relatively low payoff volatility. They can also be superior in signalling the quality of the firm to investors.

In addition to the factors stressed by these theories arguing that tokens can be superior, there are many other potential advantages of tokens. In some places, they allow regulation to be avoided. They provide liquidity from the beginning and do not tie up funds until there is an IPO or a firm is sold. There may also be tax advantages if appreciations in currency/tokens are not taxed. There may also be significant corporate governance advantages, as for example in the case of Streamr. There the platform is based on many nodes and ultimately may be fully autonomous with no human intervention. In this case, there will be no stream of equity returns and it will be a DAO where no decisions are required. The incentives to finish the platform are provided by the appreciation in the value of the coins that are issued.

Understanding the operation of DAOs and how they compare to regular equity funded firms is an important area for future research.

Regulation of ICOs

ICOs raise a whole set of interesting regulation issues. Often ICOs are structured to avoid regulation. For example, in 51% of Zetsche, Buckley, Arner and Föhr's (2017) sample, investors from certain countries were excluded from participation while 80% had no mention of the regulatory status of the ICO. In the Streamr example mentioned above, the website starts with the following message:

By continuing you agree that you are not a citizen of the following countries: The United States of America, Japan, Finland, or any other jurisdiction in which it is not permissible to participate in token crowd contributions.

There is wide range of ways in which the regulation of ICOs works in different countries.

- In China and South Korea there is an outright ban
- In the US the Securities and Exchange Commission (SEC) in July 2017 released a Report of Investigation that found a blockchain-based token qualified as a security requiring registration under the Securities Act of 1933
- Many regulatory authorities have issued a warning concerning the risks of investing in ICOs including the US, Singapore, Hong Kong, UK, Australia, Germany, and the European Union's European Securities and Markets Authority (ESMA)

However, there are a few countries where the regulation of ICOs is relatively benign. These include, the UK, Switzerland and Singapore. In general, the UK's "Regulatory sandbox" approach is helpful for allowing Fintech innovations. This allows businesses to test innovative products in the market provided they have a clear objective such as reducing costs to consumers and they are conducted on a small scale (see Financial Conduct Authority (2020)). With regard to ICOs, the UK Financial Conduct Authority (FCA) has stated that utility tokens, which are neither transferable securities nor regulated products, fall outside their regulatory product provided they only allow access to a network or product with no other legal rights attached (see Linklaters (2020)). In this case, ICOs are effectively unregulated.

Switzerland provides another good example of a regulatory system that encourages ICOs by being more permissive. The Swiss Financial Market Supervisory Authority, FINMA, divides tokens into three types (see FINMA (2018)):

- Payment tokens
- Utility tokens
- Asset tokens

The first are synonymous with cryptocurrencies, the second are intended for the purchase of a service or good, and the third are like equities, bonds, or derivatives.

The regulations that are most applicable are those concerned with anti-money laundering and securities regulation. Payment tokens must comply with anti-money laundering requirements and asset tokens with securities regulation. However, utility tokens are not treated as securities provided they can already be used to purchase a good or services when they are issued. Thus, by issuing utility tokens in their ICOs, companies can avoid regulation of the type that accompanies IPOs.

The main regulator of ICOs in Singapore is the Monetary Authority of Singapore (MAS). ICOs are largely unregulated in Singapore provided the tokens offered do not qualify as securities under Singapore law as defined by the Securities and Futures Act. The MAS holds ICO investors accountable for conducting their own legal due diligence and for addressing any risks associated with money laundering and terrorism financing (see MAS (2017) and Sleek (2020)).

The difficulty with regulation is to design rules that protect investors while at the same time allowing innovation. Outright bans like those in China and South Korea clearly protect investors but prevent innovation. Defining coins as securities as the US SEC does, achieves a similar outcome. The approach of the UK, Switzerland, Singapore allows innovation but protects investors mainly through warnings about the pitfalls of ICOs. These are designed to deter retail investors with small amounts to invest without preventing sophisticated investors

from participating. It works reasonably well in these three countries. However, there does remain a considerable amount of fraud and where deterrence works the funds from small retail investors are not used to finance the new ventures. The results of Fahlenbrach and Frattaroli (2019) on ICO investors suggest these funds can be substantial. The question is whether it is possible to do better than the current regulation.

One possible approach is to use rules similar to Rule 144A restrictions on private placements that have been quite successful in the US for the issuance of securities outside the public markets. These ICO rules could ensure that only qualified investors (both in terms of computer science, the law and finance) can participate in ICOs. Another possible approach is self-regulation. Since the market for ICOs is global to a large extent, an industry body could suggest guidelines for the structure of white papers and what they should disclose. These could benefit not only information intermediaries whose role Bourveau et al. (2019) stress, but also retail investors.

Concluding Remarks

ICOs are becoming an increasingly important way of raising funds for innovative ventures. However, they are still small relative to more traditional ways of funding innovation such as angel investing and venture capitalists. There is evidence they provide positive investor returns on average and they have a number of theoretical advantages that the literature has identified. The UK, Switzerland and Singapore have structured liberal rules that have encouraged this kind of finance in their jurisdictions. However, fraud remains high. Regulation should aim at excluding unknowledgeable investors from ICOs while providing the knowledgeable ones with significant freedom to invest in firms that innovate. If this can be done well, there is potentially substantial scope for increasing innovation and thus growth in the economy.

References

- Adhimi, S., G. Giudici and S. Martinuzzi (2018). “Why do Businesses go Crypto? An Empirical Analysis of Initial Coin Offerings,” *Journal of Economics and Business* 100 (November-December), 64-75.
- Allen, F., A. Fatas, B. Weder di Mauro (2019). “Understanding Initial Coin Offerings and its Relatives,” working paper, INSEAD.
- Beneditti, H. and L. Kostovetsky (2018). “Digital Tulips? Returns to Investors in Initial Coin Offerings,” working paper, Boston College, SSRN-id3182169.
- Bourveau, T., E. De George, A. Ellahie and D. Macciocchi (2019). “Information Intermediaries in the Crypto-Tokens Market,” SSRN-id 3193392.
- Catalini, C. and J. Gans (2018). “Initial Coin Offerings and the Value of Crypto Tokens,” working paper, MIT, SSRN-id 3137213.
- Chod, J. and E. Lyandres (2019). “A Theory of ICOs: Diversification, Agency, and Information Asymmetry,” SSRN-id 3159528.
- Cohney, S., D. Hoffman, J. Sklaroff and D. Wishnick (2019). “Coin-Operated Capitalism,” *Columbia Law Review* 119(3), 591-676.
- Fahlenbrach, R. and M. Frattaroli (2019). “ICO Investors” European Corporate Governance Institute Working Paper 618/2019, SSRN-id 341994.
- Financial Conduct Authority (2020). “Regulatory Sandbox” at <https://www.fca.org.uk/firms/innovation/regulatory-sandbox>.

- FIMA (2018). “ICO Guidelines,” <https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/>.
- Howell, S., M. Niessner, and D. Yermack (2019). “Initial Coin Offerings: Financing Growth with Cryptocurrency Token Sales,” *Review of Financial Studies* (forthcoming).
- Hu, A., C. Parlour and U. Rajan (2019). “Cryptocurrencies: Stylized Facts on a New Investible Instrument,” *Financial Management* 48, 1049-1068.
- Huang, W., M. Meoli, and S. Vismara (2018). “The Geography of Initial Coin Offerings,” working paper, University of Bergamo, SSRN id3206234.
- Linklaters (2020). “ICOs and Regulation in the United Kingdom.” <https://www.linklaters.com/en/insights/thought-leadership/fintech/a-global-view-of-icos-and-regulation/icos-and-regulation-united-kingdom>.
- Kaal, W. (2018). “Initial Coin Offerings: The Top 25 Jurisdictions and their Comparative Regulatory Responses,” working paper, University of St. Thomas School of Law, SSRN-id3117224.
- Karjalainen, R. (2020). “Governance in Decentralized Networks,” SSRN-id 3551099.
- Li, J. and W. Mann (2018). “Initial Coin Offerings and Platform Building,” SSRN-id 3088726.
- Malinova, K. and A. Park (2018). “Tokenomics: When Tokens Beat Equity,” SSRN-id 3286825.
- Momtaaz, P. (2020). “Initial Coin Offerings,” SSRN-id 3166709.

Momtaz, P. (2019). “The Pricing and Performance of Cryptocurrency,” *European Journal of Finance* (forthcoming), SSRN-id 3169682.

MAS (2020). “A Guide to Digital Token Offerings,”

<https://www.mas.gov.sg/regulation/explainers/a-guide-to-digital-token-offerings>.

Roosenboom, P., T. van der Kolk, and A. de Jong (2020). “What Determines Success in Initial Coin Offerings?” *Venture Capital* 22:2, 161-183.

Sleek (2020). “ICOs in Singapore,” sleek.com/sg/resources/icos-in-singapore/.

Zetsche, D., R. Buckley, D. Arner and L. Föhr (2017, 2018). “The ICO Gold Rush: It’s a Scam, it’s a Bubble, it’s a Super Challenge for Regulators,” University of Luxemburg Law Working Paper 2017-011, SSRN-id 3072298.