

# Risk associated to Initial Coins Offerings

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## Abstract

In the era of innovation and digital market, words like Blockchain and Cryptography spread far and wide. They open new diverse opportunities for the investors and the issuers like startups. In other words, in this alternative market, the issuers having the business model based on blockchain platform of the decentralized network can raise capital by holding the Initial Coin Offerings (ICO) instead of seeking venture capital investors, crowdfunding or do the IPO on the securities market. My paper contributes the descriptive statistics on various characters of over 3000 ended ICOs from 2014 to the end of 2018. Their associated risk also analyzed in different regions by studying value at risk (VaR), expected shortfall (ES) and minimum capital requirement guided by BCBS (2013). .

*Keywords:* Tokens, Initial Coin Offering, ICO, VaR, ES, Capital Requirement, Market Risk, Risk Measurement, Cryptocurrencies, Basel III

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## 1. Introduction

ICOs are well-known as a decentralizing raising fund method where the intermediary institutions are absent so the information will be faster and more transparent. In the end of 2018, ICO funding recorded an amount of \$24 billion which equals to 115% of the total for 2017 and the number of ICOs hit 2517<sup>1</sup>. Initial Coin Offering (ICO) is a mean by which cryptocurrency start-ups and other block-chain based companies can raise funds to finance the development of their projects. The ICOs is implemented through Distributed Ledger Technology (DTL), resulting in the issuance of tokens in exchange for cryptocurrencies. These tokens are digital assets that are issued in exchange for pre-existing cryptocurrencies at a predetermined price by the companies, and then maybe traded in the secondary market, e.g., Kraken, Poloniex. ICOs seem like Initial Public Offering (IPO) but in which their investors receive the tokens instead of the securities. Unlike classic financial instruments, the

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<sup>1</sup>ICO Market Analysis 2018 from <https://icobench.com/>

tokens are very diverse and do not offer the same benefits such as voting right, equity ownership or other specific interests. Understanding their price as well as the potential of losses is definitely important for not only investors but also the policy makers and regulatory bodies who tends find the possibility to control that unpredictable "market". One of the simplest method to measure risk is Value at Risk (VaR) which was also mentioned in the guideline called Basel III enacted by Basel Committee on Banking Supervision (BCBS) as very important tool to assess and manage financial risk. In this accord, the capital requirement was raised up and amended two times (2013 and 2019) in which ES is preferable to measure market risk capital requirement.

As such, this paper is structured as following: Institutional background of ICOs in section 2, Literature Review in section 3, Descriptive statistics of the data sample in Section 4, Specification of Risk Measurement will be explained in section 5, section 6 reveals Risk associated to ICOs and Regulation Implication and Conclusion is in last section.

## **2. Institutional Background of Initial Coin Offering**

### *2.1. What is ICO?*

Initial Coin Offering (ICO) is a mechanism by which cryptocurrency or blockchain based start-ups raise funds to finance their projects. The ICOs are implemented through Distributed Ledger Technology (DTL), resulting in the issuance of tokens. These tokens are digital assets that are issued in exchange for pre-existing cryptocurrencies or fiat currencies at a predetermined price by the startups, and then maybe traded in one or many secondary markets such as Kraken, Poloniex, Binance. ICOs seem like Initial Public Offerings (IPOs) but in which their investors receive the tokens instead of equity shares and do not have the same specific benefits such as voting right and equity ownership. The tokens provide a set of specific rights to their holders including accessing network and platform, creating and developing features or medium of exchange in their ecosystems<sup>2</sup>. The intermediaries are like investment banks, and security companies are absent in such ICOs, so the transaction cost is closed to zero. Tokens can be decentralized distributed to investors around the world which does not matter where the issuers are. The ICOs can be implemented in any stages while crowdfunding is used for funding early stages and IPOs are employed for "high-volume growth capital"<sup>3</sup> stages. Rather than IPOs, crowdfunding and venture capi-

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<sup>2</sup>Lee, Li, and Shin (2018)

<sup>3</sup>Momtaz (2018)

tal, the investors prefer ICOs because of post-ICO token liquidity. Many tokens are listed on 24/7 trading exchange platform within three months after the ICOs end. (Momtaz (2018)). In general, comparing to the conventional financing methods, the advantages of ICOs are minimum administrative document requirement, closed-to-zero transaction cost, post ICO liquidity, any-stage fundraising. However, as there is an unique appropriate regulation, there are over 40 cases of scam from ICOs (Schwienbacher and Hornuf (2018)). And the second drawback of ICOs is the risk of price depreciation since ICOs give the investors the right of prompt exit.

## *2.2. History and Evolution of ICOs*

Most cryptocurrencies do not come from ICOs. Cryptocurrency can be an digital payment assets of startup who want to raise fund by ICO. The type of tokens in that case is payment tokens, one of three token type that I will mention below. Cryptocurrencies are created from mining process, in which the miners have to solve various complicated math puzzles and reward new cryptocurrency coin. In 2009, the first 50 Bitcoin were mined and there are a variety of alternative cryptocurrencies from 2009 to 2013 which have one or some nature different from Bitcoin. In 2013, the first ICO, MasterCoin, was introduced with a protocol based on Bitcoin in which the investors sent Bitcoins to the account and receive the MasterCoin token (OMNI). MasterCoin used \$500,000 fund raised for development and operation. Similarly, in 2014, Ethereum (with the tokens named ERC20) raised over \$15 million by introducing the concept of smart contract, in which the transaction are only executed if a set of conditions are met. As such, in the first generation ICOs, in year 2012-2015, the founders focus and owned their techniques. More practical, the second ICO generation was based on smart contracts starting with the first one, DAO, raised \$150 million through its ICO in 2016. The DAO resided on Ethereum blockchain and allows the distributors to control their funds and automatize the governance rules through the open code source by Christoph Jentzsch. However it was hacked because of an error in the code and then delisted from Poloniex and Kraken in the last quarter of 2016. In 2016, over \$90 million were collected by 29 ICO fundraisers<sup>4</sup>. This number precipitously increased in 2017 with 875 ICOs and over \$6.2 billions raised<sup>5</sup>. The numbers of ICO campaign lightly slow down in 2018 but still striking, with 1,257 ICOs and \$7.8 billion raised comparing with \$5.3 billions raised by

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<sup>4</sup>See <https://www.icodata.io/stats/2016>

<sup>5</sup>See <https://www.icodata.io/stats/2017>

crowdfunding in the same year<sup>6</sup>. Most of recent ICO generation tentatively spend for the startups who asks for specific platforms to do their business. Indeed, 4721 per 5364 ICOs recorded develop their startup based on Ethereum platform and the remaining may choose other platforms like Waves, Stellar, NEO and so on.

### 2.3. *The typical process of an ICO*

In general, ICOs require to disclose an official document called "White paper" containing necessary information like protocols, blockchain platform, business model, management team and capital allocation after ICO. The White paper also may provide the details of ICO campaign including how many available tokens for sales, how many tokens for management teams, hard cap, soft cap, presale dates and its bonus and ICO date. The soft cap means the minimum amount of capital to be raised by ICO while the hard cap is maximum fundraising goal for token crowd-sales. Given the presence of White paper, the startups will do a range of marketing and PR campaign to showing up their project and how they will distributed the capital after fundraising. Then, the pre-sales, the bonus step for the earlier investors (commonly the institutional investors), may be employed for collecting the initial fund financing the main ICO. However, SEC warned investors against the token sales with high discounts. After pre-sales, the ICO will be executed as scheduled. If total fund raised meet the soft cap, the ICO succeed and if the fundraiser overwhelm hard cap, the additional subscription will be rejected. During 3 months after ICO, the tokens could be listed for trading in one or many exchange platforms.

### 2.4. *Token Types*

In this paper, I define token in 3 distinct types including utility tokens, payment token and security tokens. *Utility tokens* play as a mean which holders redeem to use the issuers' products or services. The startups prefer to issue this kind of tokens since there is few regulation in most jurisdictions. *Payment tokens* are issued to play a role of cryptocurrencies, "as a means of payment over a period of time"<sup>7</sup>. The 3rd type, *security tokens*, have different definition in according to different jurisdictions. FINMA defines security tokens (asset tokens) as a debt or equity claim on the issuers. The holders can have a share of future profit and cash flows from the startups. There are four criteria to define a security token by SEC (*Howey test*) consisting of (1) the presence of money investment, (2) profits are expected, (3) money

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<sup>6</sup>See <https://www.statista.com/outlook/335/100/crowdfunding/worldwidemarket-revenue>

<sup>7</sup>See <https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/>

investment is a common enterprise and (4) any profits come from the efforts of a promoted or third party (Momtaz (2018)).

### 3. State of the Art Literature Review

At the end of February 2019, SSRN<sup>8</sup> recorded 143 research papers, mostly issued in second half of 2018 with the keyword "ICO" comparing with 87 papers recorded in November 2018 (Malinova and Park (2018)). It means that the boom of research on ICO is along with the boom of various initial coin offerings. Those research, including *theoretical works* (such as Cong and He (2018), Catalini and Gans (2018), Sockin and Xiong (2018), Chod and Lyandres (2018), Li and Mann (2018), and Malinova and Park (2018); and *empirical works* (such as Adhami, Giudici and Martinazzi (2018), Amsden and Schweizer (2018), Momtaz (2018), Momtaz (2019), Kostovetsky and Benedetti (2018), Lyandres, Palazzo and Rabetti (2018), Howell, Niessner and Yermack (2018), Blaseg (2018), Fisch (2019), have focused on three main objectives including ICO and its regulation challenges, ICO success examination and which impacts on post-ICO and long-run token performance.

Firstly, a range of papers started with the reason why ICOs are attractive comparing with crowdfunding, venture capital and IPO (Catalini and Gans (2018), Chod and Lyandres (2018), Cong et al. (2018), Li and Mann (2018), Socking and Xiong (2018)). Despite of their evolution, regulation issues are still the biggest question since ICOs were created, studied in diverse academic papers. Chohan(2017) indicated that ICOs need to be situated within the accountability domain included controlling regulation predicated by Zetzsche et al. (2017, 2018) because of a huge of existing abuse cases, lacking quality and governance concerns. The majority of countries examined by Kaal (2018) permit ICOs and at least do not prohibit them however many of them are reviewed (Blemus (2017), Kaal(2018), Zetzsche et al. (2017, 2018)) to have some movements to firstly alert the investors from potential risks caused by investing in the tokens like United States, Singapore, Australia and so on; and secondly requires the issuers to compliant the rules same as the securities by Howey's test declared by SEC<sup>9</sup>. Each country try to design themselves the regulation to manage the ICOs which their investors are from every corners in the world. It turns out the conflict of rules (Barsan(2017)).

Secondly, the central theme of empirical studies was to examine ICO success by which fundraising hit the sort cap. Adhami, Giudici and Martinazzi (2018), Amsden and Schweizer

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<sup>8</sup><https://www.ssrn.com/index.cfm/en/>

<sup>9</sup><https://www.sec.gov/>

(2018) scrutinized different dimensions which might impact on ICO success such as white paper and its languages; code explanation availability; presale existing and thereof bonus scheme; various ICO characteristics including investors' possible rights, platform based, jurisdiction specification; management team characteristics; cryptocurrency return and volatility. A variety of factors were also mentioned such as an agency-related explanation (Momtaz (2018)), Token volatility and long-run performance of ICOs (Momtaz (2019) and Lyandres, Palazzo, and Rabetti (2018)), ICO and first trading price difference (Kostovetsky and Benedetti (2018)), ICO timing and investor sentiment (Drobetz, Momtaz and Schroder (2019)), the importance of information disclosure and success signal (Fisch (2019), Blaseg (2018), Borgeau et al. (2018), Momtaz (2019), moral hazard factor (Momtaz (2019), wisdom of crowd impact (Lee, Li and Shin (2018)) and geographic features (Huang, Meoli and Vismara (2018)).

Post-ICO performance is also discovered with varied perspectives. On the one hand, from theoretical point of view, Cong, Li and Wang (2018) contributed a dynamic asset-pricing model of tokens with two variables the user-base externality and user adoption. This model showed that tokens could capitalize more user adoption which could enhance the return and reduce the use-base volatility since increasing token prices could generate more agents participating in the platform. Catalini and Gans (2018) suggested a model token value from the perspective of consumer demand which indicated that there would be a trade-off between stable price goals and the total amount of fundraising and ICOs may increase issuer's return further than traditional financial equity by "eliciting consumers' willingness to pay"<sup>10</sup>. On the other hand, empirical works have concentrated with token post-ICO performance review. Howell, Niessner and Yermack (2018) found that the liquidity is higher with tokens whose issuers are volunteer to disclose the information. Based on the model Ritter (1991), Ritter, Xie, and Zhang (2018) studying long-run under-performance of IPOs, Lee, Li and Shin (2018) study the relationship between 3-month, 6-month and 1-year total token returns with analyst rating including team characteristics, vision and product; and Know Your Customer policies.

My study, beside empirical literature contribution of the descriptive statistics of various ICO characteristics, examine financial risk associated to tokens. This paper highly relates to Lo and Medda (2018) which studied on the price of 88 tokens using panel ordinary least squares (POLS) with cluster-robust standard errors and conclude that the token types have strong impact on their price; Benedetti and Kostovetsky (2018) which did panel regressions

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<sup>10</sup>Lee, Li and Shin (2018)

above various variables to see the token price determinants; and Masiak et al. (2018) which did the time series analysis by using VAR model to address the relationship of token prices with Bitcoin and Ether prices.

#### 4. Descriptive Statistics of the Sample

I manually collect data of 3215 completed ICOs from August 2015 to December 2018 in different ICO information provider platforms, namely ICObench.com, Tokendata.io, Coin-MarketCap.com, Cryptocompare.com, ICOdata.io, icorating.com, ICOalert.com, Coindesk.com, TokenMarket.net. The data range include token names, presale beginning and ending date if the ICOs consist presales, ICO beginning and ending date, country of origin, token type, Whitelist/KYC information, hard cap, soft cap, number of token for sales, distributed rate, price in ICO total gross proceed (capital raised), price on March 09. However, not all ICO characteristic information could be collected, so the number of observations may differ along various dimensions.

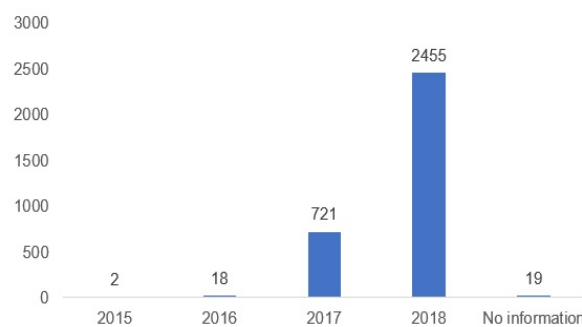


Figure 1: Number of ICOs by year

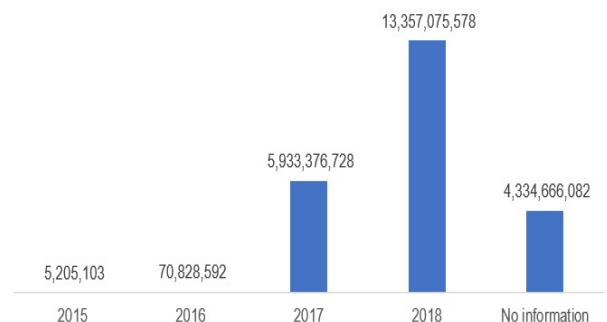


Figure 2: Gross proceeds by year

##### 4.1. Location

2,455 ICOs are recorded in 2018, 721 ICOs in 2017, 18 ICOs in 2016, 2 ICOs in 2015 and 19 ICOs without date information, raising \$13.3 billion, \$70 million, \$5.2 million and \$4.3 million relatively (Figure 1, 2). As such, the growth rate of fundraising is not as high as number of ICO campaigns. USA is recorded as the top 1 fundraiser by 432 ICOs and \$7.4 billions raised. Singapore, UK, Russia and Switzerland follows with impressive results. On average, the capital raised by ICOs are

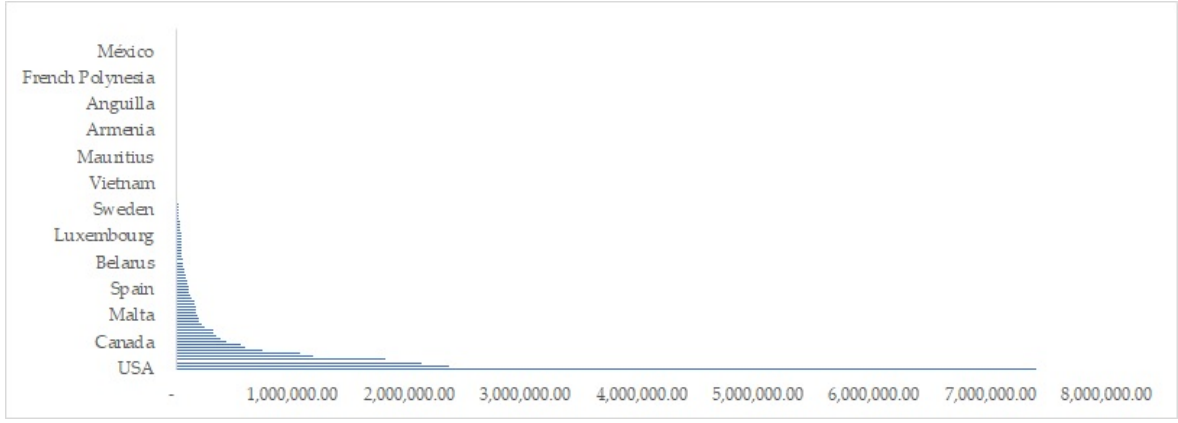


Figure 3: ICOs by countries

#### 4.2. Token types

The startups who chose ICO method for fundraising and was not cryptocurrency issuer tentatively prefer issuing utility tokens instead of security type. Literally, 97% of tokens issued are utility type while 2% are security and 1% are payment type (Figure 4).

#### 4.3. KYC and Whitelist

In 1960 ICOs having KYC/Whitelist information, 34% of them applied both KYC and Whitelist requirements, 26% applied only KYC, 8% applied only Whitelist and the remaining, 32% ignored KYC and Whitelist (Figure 5).

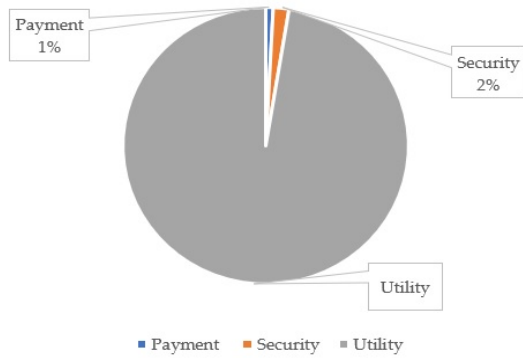


Figure 4: Token types

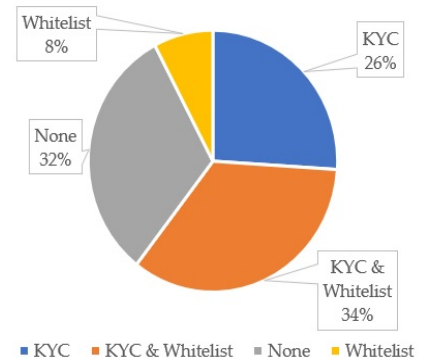


Figure 5: Gross proceeds by year

#### 4.4. Pre-sales

Table 1 shows the basis statistic of various ICO characteristics. There are 1,487 ICO observations in which the pre-sales existed with the average duration of 34 days. The pre-sales presentation rate, hence, is 46.25% with assumption that no information means that pre-sales was not implemented.



#### 4.5. Protocols

Our data shows that 2,501 tokens (78%) issued based Ethereum technology and blockchain, in which 2,451 tokens use ERC20 smart contracts and the others use other types of Ethereum blockchain such as ERC223 (the updated version of ERC20), ERC23, ERC664, etc. The second most popular technology employed is Waves blockchain with 31 tokens (1%). Other blockchains should be named like Stellar (used by 18 tokens), NEP ( used by 11 tokens), and X11 (used by 5 tokens). The remaining tokens are based on either other blockchains or their owned technology.

#### 4.6. Accepting mediums of exchange

The buyers ordinarily have to send the payment (commonly in cryptocurrencies) to the issuers to receive the tokens. There are a portion of the issuers accept fiat currencies as the medium of exchange. Our sample data indicates that 12% of tokens (400 tokens) allows exchange in fiat money. Besides, most of issuers prefer using Ether (ETH) since 84% of our token data accept ETH (2,689 tokens relatively). Bitcoin (BTC) is also favored by 1,289 tokens (40%). Another most common cryptocurrency is Litecoin (LTC) since accepted by 436 issuers (14%). Bitcoin Cash (BCH) and Dash (DASH) are also popular as the medium of exchange, allowed by 171 and 136 issuer relatively.

	N	Min	Q1	Median	Mean	Q3	Max	St. Dev
Presale Length (days)	1,486	1	15	29	34	36	379	33.04439
ICO Length (days)	3,197	1	29	35	54	63	386	43.98864
Hard cap/ Soft cap (times)	1,507	1	4	7.5	111.7	14	100,000	2,662.27
Distributed Rate	2,343	0.0100	0.4300	0.6000	0.5652	0.7000	1.0000	0.2045832
Gross Proceeds (USD)	1,486	420	1,387,000	5,000,000	15,950,000	14,000,000	4,198,000,000	119,942,300
Price in ICO (USD)	3,101	0.000	0.050	0.200	7.746	0.800	7554.600	151.3441
Price on 15/4/2019 (USD)	1,213	0.000	0.001	0.006	6.299	0.038	5053.110	148.9387
Price Difference	1,169	-2687.580	-0.6292	-0.1308	-6.5553	-0.0298	799.8920	119.8064

Table 1: Descriptive Statistics of ICO characteristics

#### 4.7. ICO data

The average ICO duration is 54 days. Top countries by capital raised implements ICO in around 50 days, for instance, USA 55 days, Singapore 44 days, Switzerland 49 days and UK 59 days on average. The issuers normally set the hard cap much higher than soft cap. As there are some outliers who set the "heaven" hard cap, the median should the good average number. In general, hard cap was introduced 7.5 higher than soft cap. Given the numerous

available tokens for sales, the average distributed rate is 56.52%. The gross proceeds are highly skewed since the mean is \$15.9 million and the median is just \$5 million. It means that there were only a certain number of ICOs raising high capital.

In term of price, which I focus on this paper, there are a lot of remarkable things. The range of token price during ICO is diverse. The average price of observable token is \$7.746 while the median is \$0.2. It says that the big proportion of ICOs issue the token with "cheap" prices. Literally, 2,414 in 3,101 tokens has price smaller or equal to 1 (78%) in which 6% have ICO price smaller than \$0.01 and . In 1,088 ICOs that I could find their price information on March 09, there are 447 not trading ICOs<sup>11</sup> and 146 ICOs with token price smaller than \$0.01. It means that nearly 50% of token prices are closed to zero (Figure 6).

#### 4.8. Price Data

Token price data was collected on Cryptcompare.com through free API supplied<sup>12</sup>. Only one-third of 3,215 tokens mentioned above (1,088 tokens) have been listed. Their price and volume data is amassed from *November 15, 2017 to April 15, 2019*. I divided the price and volume data into 2 sets (Table 2). The first set consists of 486 tokens having price in whole time series of November 15, 2017 to April 15, 2019 (517 days) while other 318 tokens with data from July 15, 2018 to April 15, 2019 (275 days) are grouped in second data set. The remaining tokens not recorded here are listed after July 15, 2018. I study the properties of each group by regions, including United States (US), European countries (Europe)<sup>13</sup> and Asia countries (Asia)<sup>14</sup>, and by token types including utility, security and payment tokens defined by ICObench.com<sup>15</sup>.

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<sup>11</sup>Those ICOs ended before December 2018. It means that they are not traded after more than 3 months of ICO.

<sup>12</sup>Those data is sourced from aggregated 150 crypto exchanges. Closing prices (hereby token price) are daily recorded based on 00:00 GMT time and converted to US dollar (USD). If data is not available since the cryptocurrency is not traded in USD, BTC conversion rate will be utilized. See <https://min-api.cryptocompare.com>.

<sup>13</sup>Including Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Guernsey and Jersey, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Ukraine

<sup>14</sup>Including Afghanistan, Armenia, Bangladesh, Cambodia, China, Cyprus, Georgia, Hong Kong, India, Indonesia, Israel, Japan, Kazakhstan, Kuwait, Kyrgyzstan, Laos, Malaysia, Pakistan, Philippines, Singapore, South Korea, Taiwan, Thailand, Turkey, United Arab Emirates, Vietnam

<sup>15</sup><https://icobench.com/>

Available Data Period	15/11/2017 - 15/4/2019 (517 days)		15/7/2018 - 15/4/2019 (275 days)	
Token Type	Utility	Security & Payment	Utility	Security & Payment
US	74	6	50	2
Europe	197	6	145	2
Asia	118	4	80	2
Total	468	16	312	6

Table 2: Number of cryptocurrencies by group

## 5. Specification of Risk Measurement

Given token return on day  $t$  ( $R_t$ ), is defined as:

$$R_t = R_t - R_{t-1}$$

$R_t$  is the generic variable on the probability space  $(\Omega, F, P)$ . Assuming that  $\Omega = R$  we can observe a sequence  $(R_1, R_2, \dots, R_t)$ . At time  $t$ , VaR associated to  $R_t$  ( $VaR_{\alpha,t}$ ) satisfies:

$$P[X_t < -VaR_{\alpha,t} = \alpha]$$

In other words,  $VaR_{\alpha,t}$  is the  $\alpha$  – quantile on the left hand side of distribution  $F$  of  $R_t$  until time  $t$ . Hence,  $VaR_{\alpha,t}$  can be defined as the maximum losses encountered over one certain period with  $1 - \alpha$  confidence level. Otherwise, Expected Shortfall associated to  $X$  at time  $t$  ( $ES_{\alpha,t}$ ) is:

$$ES_{\alpha,t} = E[R_t | R_t < -VaR_{\alpha,t}] = \alpha$$

In this paper, the empirical distribution is employed to compute the  $VaR_{\alpha,t}$  and  $ES_{\alpha,t}$  at different confidence level. Besides, the market risk capital requirements are calculated by using 97.5 percentile, one-tailed confidence level Expected Shortfall (ES) as recommended at BCBS (2013), p.89. To figure out the market risk capital requirements in US dollars, this below equation is employed:

$$MRC = ES_{97.5\%} * K$$

in which,  $K$  is total amount of capital in US dollar raised during ICO.

## 6. Risk associated to token return

Table 3 provides statistic figures of  $VaR_{\alpha,t}$  and  $ES_{\alpha,t}$  on April 15, 2019, for three levels of confidence including 95%, 97.5% and 99% in US, EU and Asia respectively. Apparently, the maximum losses as well as the Expected Shortfall in Asia are higher and there might be no loss with EU and Asia tokens. Meanwhile the potential of losses associated to US token return is from 7.02%, 9.86% and 11.24% at the confidence level of 95%, 97.5% and 99% respectively. However, the range of VaR in US is smaller than 2 other regions at 95% confidence level, indeed, the riskiest US token has lower potential losses than in EU and Asia. The potential of losses associated to token return are popularly around **10% - 20%**, **13% - 30%** and **16% - 45%** at 95%, 97.5% and 99% confidence level.

		min	1st Qu.	mean	median	3rd Qu.	max
<b>VaR 95</b>	<b>US</b>	-0.4654	-0.16366	-0.1549	-0.1300	-0.1059	-0.0702
	<b>EU</b>	-0.4986	-0.21739	-0.1650	-0.1364	-0.0971	0.0000
	<b>Asia</b>	-0.4971	-0.21168	-0.1588	-0.1300	-0.0952	0.0000
<b>VaR 97.5</b>	<b>US</b>	-0.6562	-0.2194	-0.2208	-0.1758	-0.1397	-0.0986
	<b>EU</b>	-0.6401	-0.3001	-0.2325	-0.1793	-0.1369	0.0000
	<b>Asia</b>	-0.9069	-0.3044	-0.2275	-0.1730	-0.1279	0.0000
<b>VaR 99</b>	<b>US</b>	-0.9991	-0.3803	-0.3124	-0.2294	-0.1755	-0.1124
	<b>EU</b>	-0.8530	-0.4394	-0.3176	-0.2584	-0.1766	0.0000
	<b>Asia</b>	-0.9994	-0.424	-0.3271	-0.2426	-0.1686	0.0000
<b>ES 95</b>	<b>US</b>	-0.6694	-0.3158	-0.2539	-0.2032	-0.1594	-0.1033
	<b>EU</b>	-0.8907	-0.3497	-0.2666	-0.2194	-0.1610	0.0000
	<b>Asia</b>	-0.8355	-0.3509	-0.2690	-0.2108	-0.1654	0.0000
<b>ES 97.5</b>	<b>US</b>	-0.9993	-0.5362	-0.3973	-0.3010	-0.2295	-0.1398
	<b>EU</b>	-0.9152	-0.5335	-0.4002	-0.3439	-0.2310	0.0000
	<b>Asia</b>	-0.9997	-0.581	-0.4177	-0.3671	-0.2329	0.0000
<b>ES 99</b>	<b>US</b>	-0.6694	-0.3158	-0.2539	-0.2032	-0.1594	-0.1033
	<b>EU</b>	-0.8908	-0.3497	-0.2666	-0.2194	-0.1610	0.0000
	<b>Asia</b>	-0.8355	-0.3509	-0.2690	-0.2108	-0.1654	0.0000

Table 3: Risk associated to token return by region, period 15/11/2017 - 15/04/2019

Due to different level of capital raised, the market risk capital requirement changes. Specifically, the average capital needed for market risk provision is highest in the US while

	US	EU	Asia
min	50,559	2,737	0
1st Qu.	1,470,965	674,755	769,547
mean	5,477,711	3,512,574	8,029,717
median	3,252,547	1,830,706	2,264,971
3rd.Qu	6,842,709	4,778,384	5,207,533
max	36,018,307	35,129,714	115,475,970

Table 4: Market risk capital requirement

the  $ES_{97.5\%}$  is lowest among three regions. In the EU, through  $ES_{97.5\%}$  is quite high, the required market risk capital is lowest. It might be said that the smaller capital ICOs have higher potential losses.

Table 5 shows fifteen tokens with highest VaR at 95% confidence level in three regions whose ICO information is provided in table 6. Descriptive statistics of those fifteen tokens' return is also illustrated in table 5. Conventionally, their return is negative on about half of time. It can be seen that their return positively skewed and have kurtosis much higher than 3. It can be said that their return's distribution is not normality.

## 7. Regulation Implication and Conclusion

Tokens or cryptocurrencies are still a "market" containing multiple doubts. It might be either a "smart" solution by offering non-intermediary cost and possibility to implement in any stage or a fake project crowdfunding by issuing tokens. The speculative investors or token holders should understand the business model of each ICOs as well as their potential risk. In the meantime, the regulators besides give warnings may issue obligation provision rate for token issuers. For further research, I suppose to more detailed study the assessment for ICO risk measurement since their return is not normally distributed so VaR or ES might be biased estimation method.

	US					EU					Asia				
	BDC	ACP	POP	EMB	DAR	ATS	DGPT	VLTC	INXT	WHO	OPT	SBT	BCO	COB	NTO
VaR95	-0.465	-0.376	-0.359	-0.356	-0.307	-0.499	-0.473	-0.462	-0.4197	-0.383	-0.497	-0.494	-0.444	-0.338	-0.324
ES95	-0.650	-0.669	-0.511	-0.478	-0.529	-0.551	-0.691	-0.534	-0.5292	-0.575	-0.525	-0.516	-0.648	-0.473	-0.432
VaR97.5	-0.209	-0.184	-0.186	-0.118	-0.370	-0.514	-0.640	-0.505	-0.4981	-0.578	-0.235	-0.381	-0.098	-0.526	-0.174
ES97.5	-0.352	-0.279	-0.341	-0.172	-0.661	-0.677	-0.909	-0.643	-0.6605	-0.761	-0.371	-0.762	-0.140	-0.851	-0.241
VaR99	-0.753	-0.835	-0.509	-0.538	-0.733	-0.543	-0.853	-0.526	-0.5956	-0.715	-0.525	-0.525	-0.795	-0.529	-0.506
ES99	-0.650	-0.669	-0.511	-0.478	-0.529	-0.551	-0.691	-0.534	-0.5292	-0.575	-0.525	-0.516	-0.648	-0.473	-0.432
mean	0.154	0.225	0.080	0.034	0.085	0.065	0.171	0.039	0.0495	0.053	0.0509	0.039	0.146	0.018	0.195
sd	1.357	2.438	1.159	0.359	0.908	0.452	1.320	0.342	0.3666	0.597	0.3615	0.326	1.227	0.230	3.562
median	0.000	0.000	0.001	0.000	-0.001	-0.001	-0.004	0.000	0	0.000	0.0009	0.002	-0.003	0.000	-0.003
min	-0.981	-0.980	-0.688	-0.780	-0.949	-0.861	-0.944	-0.675	-0.708	-0.830	-0.667	-0.565	-0.912	-0.527	-0.986
max	20.925	50.374	25.465	5.176	17.904	5.835	16.494	2.080	3.2646	10.109	1.9472	2.013	19.118	1.078	79.782
skew	10.708	17.516	20.390	6.995	15.293	4.726	8.357	2.532	3.0995	10.998	1.4786	2.500	10.561	1.828	21.698
kurtosis	134.701	346.994	442.939	85.877	286.866	50.993	80.842	10.508	17.583	164.634	3.266	9.188	136.303	6.964	480.303

Table 5: Descriptive Statistics of Selected Utility tokens' return

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Token	Token name	Business	Country	ICO started	ICO ended	Raised Amount	Distribute at ICO
BDC	Big Data Coin	Data monetization platform	USA	9/22/2017	10/31/2017	NA	NA
ACP	Icoico	ICO launching platform	USA	11/17/2017	3/1/2018	NA	NA
POP	PopChest	Decentralized video distribution platform	USA	11/12/2018	11/30/2018	NA	NA
EMB	Embermine	Content creators and collaborators	USA	5/5/2017	6/2/2017	80,000	NA
DAR	Darcus	Enterprise-grade applications	USA	12/21/2016	12/26/2016	297,426	0.7
ATS	Artis	Payment platform	Austria	10/1/2018	10/26/2018	NA	NA
DGPT	DigiPulse	Inheritance service	Latvia	10/1/2017	10/31/2017	NA	NA
VLTC	ContractVault	Agreement Platform	Switzerland	7/15/2018	8/31/2018	6,225,673	0.1
INXT	Internxt	Cloud computing network	Spain	9/7/2017	9/28/2017	206,017	NA
WHO	WhoHas	Social platform	Germany	2/21/2018	3/23/2018	NA	NA
OPT	Opus	Decentralized music platform	United Arab Emirates	7/24/2017	8/24/2017	5,800,000	NA
SBT	STAR BIT EX	Decentralized exchange	Taiwan	8/1/2018	8/31/2018	NA	0.5
BCO	Bananacoin	Banana plantation support	Laos	11/29/2017	2/28/2018	4,769,155	0.47
COB	COBINHOOD	Cryptocurrency exchange	Taiwan	9/13/2017	10/22/2017	13,200,000	0.89
NTO	Fujinto	Open source cryptocurrency	Japan	8/10/2017	9/10/2017	17,566,200	0.5

Table 6: ICO information of 15 tokens in table 5