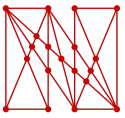

Economics of Initial Coin Offerings

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Abstract

This work provides an overview of key economic aspects surrounding Initial Coin Offerings (ICOs) and the issued "application tokens" (also known as appcoins). The purpose here is to layout a simple and accessible mental model of the structural and dynamic properties of ICOs and the overall market.

Part 1 introduces tokens, ICOs and the concept of regulatory arbitrage and how the latter may apply to the current token issuance process. A mental model is constructed to understand the structural (or microeconomic) properties of application tokens, and their proposed commercial purposes and issuance models. Key aspects of this analysis are to demonstrate the economic realities (and complexities) of the issuance process and the tokens themselves.

ICO market dynamics (or macroeconomic) properties are assessed in Part 2. Here the key focus is to highlight the potentially unsustainable and unstable state of the current market using known economic frameworks.

Part 3 summarises key legal, regulatory and communications aspects that could provide stability (or a softer landing) to the ICO market in a possible abrupt decline from the current state.

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Part 1: Introduction to ICOs and Tokens

Introduction

When commenting on the then-nascent category of science fiction, author and editor Theodore Sturgeon famously said that *"90% of science fiction is crap, but 90% of everything is crap."* That certainly didn't stop science fiction from becoming one of the most popular and culture-defining genres in film, television, and literature.

With technical, institutional and customary barriers to fundraising crumbling ever faster, one consequence is that alternative forms of investment (and methods of evaluating them) are emerging. But just as the Internet itself simultaneously gave us greater access to the sum of human knowledge *and* fake news, we may have to deal with a similar double-edged sword when it comes to financial innovations driven by blockchain technology. For *"when there are completely free markets there is not only freedom to choose; there is also freedom to phish"*[0], meaning that while we may be opening the door to greater freedoms and efficiencies, we also need to be ever vigilant and mindful of bad actors who will take advantage of the free market to exploit consumers. In order to maximise the benefits of blockchain technology, we need to severely bruise the "90%" of crap in the industry and strive to be counted among the "10%".

The market for Initial Coin Offerings (ICOs) is a relatively new and complex phenomenon, which consists of organisations issuing transferable tokens to the general public. In this work when we talk about tokens we will be referring to the "Appcoin" type model, rather than tokens that may represent traditional securities e.g. equity, debt or profit sharing etc [12]. The issued appcoin type tokens enable holders to access a product or service at some preferential commercial arrangement (e.g. discounted price or exclusive access), and the tokens can be traded on an open market e.g. a cryptocurrency exchange. As these tokens are potentially liquid and inelastic (due to being issued at a fixed supply) their price can fluctuate based on the market's perception of the viability of the issuing company and or demand for the underlying product or service.

One of the key challenges with ICOs and the issued tokens is that it is an emerging market where there are significant variances of quality between individual offerings, an absence of a best practice framework to identify good quality from bad and an avoidance of any form of fiduciary responsibility and clarity on consumer protection by issuers.

However, the U.S. Securities and Exchange Commission (SEC) has recently issued an investigative report [1] cautioning market participants that offers of digital assets by "virtual" organisations may be subject to the requirements of US federal securities laws. It has also been noted that classifications of digital tokens as a security will depend on a case by case basis and will relate to the facts and circumstances, including the economic realities of the transaction. Therefore, while the SEC has clearly taken a stance and highlighted that ICOs similar to the The DAO (i.e. decentralised investment funds) are securities, it is still not entirely clear what the boundaries are for token issuances in general. In addition, it is also unclear how regulators around the world uniformly view tokens issued through an ICO process, and what factors would trigger their oversight, to say nothing of how tax authorities approach the category. Even with the SEC's report this is the wild west of financial services, where value is blindly being created through regulatory arbitrage, and where there is probably more at stake than there ever was was with the emergence and commercialization of the Internet.

This work is an exploration of this emerging market, and is intended to shed light on several important aspects of the potential underlying structural and dynamic economics of ICOs, the issued tokens (appcoins or application tokens) and their "economic realities". In order to gain a better understanding of the economics of ICOs we would first like to make the reader aware of a little known gambling sensation known as *Pachinko*.

Pachinko Market

Gambling for cash was illegal in Japan prior to legalization in late 2016. Until then some exceptions such as horse, boat, motorcycle and bicycle racing and lotteries existed, however this is now slowly changing [2]. Nevertheless, over the years determined entrepreneurs found simple yet effective methods to bypass Japanese gambling laws. One of the most popular methods of bypassing these laws was that utilized by parlors operating the pinball style arcade game known as Pachinko. Whilst almost unheard of outside of Japan, Pachinko caused the emergence of a thriving gambling market within Japan with approximately 11,000 Pachinko parlors nationwide generating gross revenues of $209billion in 2015, approximately 4-5% of Japan's GDP [3] [4].

Figure 1 : Inside a Pachinko Parlour
Photo by George Keeks, http://www.lazerhorse.org/wp-content/uploads/2014/06/2041485191_1366201476.jpg

Pachinko works as follows [5]:

- Players enter a Pachinko parlor and purchase/rent steel pachinko balls with Yen.
- Players take the balls to a Pachinko machine (pictured above), which resembles a vertical pinball machine.
- Like loading a traditional pinball machine with coins, players load their balls into the Pachinko machine and press and release a spring-loaded handle attached to a padded hammer, which then launches the ball into a metal track. The track guides the ball to the top of the machine where it loses momentum and falls into the playing field.
- If one of the balls in the playing field hits certain targets during the fall through the Pachinko machine players have a chance to win more balls.
- The more balls players possess, the longer they can remain in the game, increasing their chances of winning more balls.
- The balls, in and of themselves, have little intrinsic value as they belong to the gaming parlor. However, once players have finished they take their remaining balls (including any extra balls won in the game) to a prize booth in the parlor where they collect prizes equating to the value of their Pachinko ball winnings. If a player began with ¥10 of balls, and ended with ¥20 of balls he can collect a teddy bear worth ¥20. The key point here is that gambling for cash is not allowed in Japan, hence prizes must be anything but cash.
- Now this is where it gets interesting. As the Pachinko parlor is forbidden by law from awarding cash prizes, it gives a "cash equivalent prize". However, the Pachinko parlors have an associated, but normally separate, independent business located outside the parlor that "buys" the prizes for cash!

- Effectively the steel balls and prizes are merely a promise for cash. This makes the parlors reputation of great importance as players must trust that the Pachinko balls will be redeemed for prizes that will in turn be redeemed for cash!

Pachinko parlors have built a thriving gaming (and closet gambling) industry operating subtly yet effectively in plain sight. Pachinko's market size as stated earlier clearly shows there is either huge demand for this type of game, or that this game is a substitute for the simple and unadulterated concept of casino style gambling. The key question is which is it?

The Pachinko Effect

Pachinko is a cultural phenomenon in Japan, it is more than just a game but also more than just gambling. But we can see that the gambling aspect of Pachinko is contrived and not an optimal substitute for the "real thing". To some degree, Pachinko parlors have been one of the easiest ways for the Japanese market to fulfill its gambling demand by the only means it could easily do so, through a contrived mechanism designed to overcome legal restrictions on casino style gambling with cash. In so doing, Pachinko parlors have become a suboptimal substitute for an open gambling environment. Suboptimal because (i) Pachinko parlors can only offer one simple game that cannot compete with the wide variety and assortment of games offered by a casino and (ii) the process of gambling with Pachinko is a bit inconvenient if you just want to simply gamble!

Figure 2 : Outside a Pachinko Parlour
Photo by Artemis, https://otakulounge.files.wordpress.com/2016/06/131-picture3.jpg

The legalization of casino style gambling in Japan was the result of the Japanese government recognizing the opportunity to tax the sizable gambling market, increase tourism and stimulate economic growth [6]. With the introduction of these new laws, chances are the gambling market will expand as casinos start to provide a greater variety of gaming to meet a wider range of customer interests and requirements. Pachinko's market share will likely decrease as the demand shifts toward a casino model of gambling. However, there is a strong possibility that contrived business models, such as those around Pachinko parlors, will adjust to increase their appeal in the new gambling environment. Depending on the cost and availability of gaming licenses, existing Pachinko parlors may enable players to directly win cash prizes and or the parlors may shift to start offering other forms of gambling machines e.g. traditional slot machines and the more recent technologies of Fixed Odd Betting Terminals that have caused some stir in the UK [7].

It is key to note that under the new gambling laws, while establishments may be under tighter oversight and controls for the protection of vulnerable players, leading to higher operational costs, there is also greater potential for commercial opportunities and revenues, and more choice for gamblers.

Why are we talking about Pachinko in an article titled 'The Economics of ICOs'? Well, because the phenomenon of Pachinko draws similarities with the majority of contrived explanations and models in the crypto space designed to distance ICOs and issued tokens from securities, in particular those classified as "non-profit infrastructure tokens". The construction of these "workarounds" to leverage regulatory arbitrage opportunities to execute an undercover securities issuance may be limiting the vision and creativity required to see the true scale of what ICOs and digital tokens may represent, and blinding many in the industry to possible risks if they take the wrong path.

Initial Coin Offerings (ICOs)

The introduction of Bitcoin [8] in 2009 gave us tools and infrastructure to transact primitive digital tokens of value (bitcoin in the case of the Bitcoin blockchain) over the open public Internet without trusted intermediaries. However, in order to create new tokens one either needed to deploy and scale a new blockchain network (likely forked from Bitcoin), or issue tokens on top of an existing blockchain network such as Bitcoin (through metadata encoded into raw transactions). The former was an uphill struggle due to challenges of scaling and achieving network effects for a new blockchain, and the latter was challenging due to the complexities of trying to encode sufficient information related to new tokens into raw Bitcoin transactions. Neither model was ideal.

However, with the introduction of Ethereum [9] in 2015 came the concept of decentralized smart contracts. The Ethereum blockchain not only provided the infrastructure for transacting primitive digital tokens (ether in this case) but also provided the capability for easily creating and autonomously managing other secondary digital tokens of value over the open public Internet without trusted intermediaries.

Using this concept of smart contracts, which are effectively applications running atop a decentralized network, tokens can be created and allocated to users, and made to be easily tradable. This process of creating tokens and distributing them to users in return for a network's primitive digital token (cryptocurrency) is called an ICO process, and can be seen as a novel distribution channel for assets.

Not All Tokens Are Created Equal

This paper is not meant to be an introduction to the technically rich world of cryptography, blockchains and consensus mechanisms, for which there are numerous excellent entry level resources (e.g. The highly detailed and yet accessible introduction by F. Ametrano [19]). However, the key point to keep in mind is that secondary tokens are not like primitive tokens (cryptocurrencies such as bitcoin and ether) that are intrinsic to the "structural integrity" of a blockchain network.

Open public peer-to-peer value transfer networks, such as Bitcoin or Ethereum, need to survive complex attack vectors [21] in an open hostile environment - where all parties (hosting or accessing the network) are assumed to be self interested and focused on maximising their own value. In this scenario the key question is how can all parties be incentivised to work for the greater good of securing the network while fulfilling their self-interest.

This leads us to the real innovation of the blockchain network, the primitive token (or cryptocurrency). As well as being the subject of transaction between parties on the network (the users), the primitive token is also used to incentivise key parties competing to reach consensus (the miners) as quickly as possible on the state of the blockchain ledger (i.e. who owns what primitive token). The reward for securing the network and reaching consensus is either new supply of primitive tokens or transaction fees.

In this model, trust is created from mistrust through expending energy in the mining process, which makes the violation of the "sanctity of the blockchain ledger" expensive and economically unfavorable to the alternative of securing the network and being rewarded in the native store of value for the effort

of doing so[4]. It is a self-contained system that is simple and beautiful in its implementation, and requires no more rules and controls than are necessary.

Here you can see the core purpose and the unique nature of a cryptocurrency, and why it is fundamental to a blockchain network: *cryptocurrency is the atomic element from which the open public blockchain network is forged*. On the other hand a secondary token, that is created on top of a blockchain network, is merely a representation of some "property rights" that may (or may not) be external to the blockchain e.g. "real world assets" or access to products/services.

Essentially, one can leverage the network effects of the underlying blockchain and its cryptocurrency to create and issue (through an ICO process) secondary tokens for any purpose, but this merely uses the open public blockchain as an independent "custody or notarisation" data layer.

ICOs and Token Issuance

One of the most obvious and natural use cases for ICO based secondary token issuances is to represent some form of traditional security e.g. equity, debt, participation in profit sharing, etc. As well as issuance, allocation and transferability being programmed into an immutable smart contract, one can also predefine a set of events such as cash flow rules that can be triggered either at set times or by specific external events. There are a number of reasons why a public blockchain infrastructure makes sense for the issuance and administration of financial securities, which are mostly related to custody regulations around how client money and asset are managed through their life cycle (which we will discuss in future work).

However, since the "offer and sale" of securities is in and of itself highly regulated, several models have been devised by startups to enable the issuance of tokens through an ICO distribution model whilst not falling afoul of securities regulations. As well as the question around whether a token is a security or not there are also a number of other unanswered questions related to tax of capital gains and KYC/AML rules. These are some of the regulatory and statutory financial considerations that are currently an ongoing area of scrutiny and development [10] [11]. While we will look at some of these points in Part 3, the key focus in Parts 1 and 2 will be to understand the economic realities underpinning an ICO, the issued tokens and their uses. In light of the recent SEC investigative report, such aspects will be the most critical on how ICOs and the issued tokens are classified by regulators globally.

Tokens

One of the most prominent ICO models has been the creation and issuance of digital tokens called "Appcoins" [12]. As discussed in the introduction, this is where the issued digital token represents access to some product or service that either already exists or will exist in the future. Buying these tokens can naively be considered as purchasing a "software license" that gives the holder the "right" to access the final product or service. However, unlike normal licenses these issued tokens are easily transferable, either directly between users (over the counter) or through an established cryptocurrency exchange. This ease of transferability of the tokens on an exchange enables liquidity and thus drives price volatility based on the market's perception of the issuing project.

The theory is that if tokens provide access to a future product or service their value will increase as the product is launched and its usage increases. Therefore, early adopters (ICO participants) benefit from the upside through capital gains of the issued tokens. The economic structure of the issued tokens, their dynamics and impacts on stakeholders are considered in this article.

[4] Proof of Work (PoW) is currently the only viable and dominant consensus mechanism, however there are other emerging mechanisms such as Proof of Stake (PoS) or hybrid models.

Gnosis

An example of one of the most prominent ICOs is the Gnosis issuance, which raised the equivalent of $12 million in Ether in less than 15 minutes of commencement, but issued only 5% of its total supply of tokens (GNO). This means the total market cap of the tokens post-issuance was ~$300 million, and all before any commercially viable product was even built [13]! The Gnosis publication provides a limited sense of the ICOs structure, how the GNO tokens work and the possible value a buyer is getting [14]. The "Terms of the Token Sale" by Gnosis Limited [15] reveals the depth of legalese surrounding the issuance, the kind one would find in a securities private placement, but there is little or no discussion about the economic complexities and resulting risks of the ICO or the issued tokens. However, even for someone with sufficient expertise in financial engineering, risk and technology it is not straightforward to quickly decipher the convoluted nature of how these tokens work, their possible economic dynamics and the potential value and risks they may represent.

As highlighted earlier, the purpose of this article is not to provide a critique of the Gnosis (or any other) issuance, but instead to lay out a framework on analyzing the economic realities behind such tokens in order to understand the value and risks they may represent. Ostensibly from the above Gnosis ICO this is not a simple process, so we will attempt to unbundle the complexity by using a simple and straightforward ICO thought experiment for creating a Laundry service.

Laundry Tokens

Imagine we are industry experts in providing laundry services, and we publicly announce a plan to open a new chain of laundry shops, where the development will be funded through an ICO process. The tokens would be issued at a price of 1 Laundry Token (LTX) for $1 and will enable holders to gain access to laundry services in all laundry shops that are a part of the new chain. However, we will only ever issue 1 million LTX, thereby creating *artificial scarcity*. In addition, this will be done through an independent third party to ensure we are unable to defraud the system i.e. the independent third party will ensure that we cannot issue more LTX and or recall LTX already issued to people, and ensure the LTX already issued will be honored for their intended purpose. Furthermore, imagine that the LTX price can go up and down based on supply and demand, and that they are easily transferable between users at the fair market rate. Under the efficient market hypothesis, the value at which the tokens are exchanged in a sufficiently liquid market will capture all the market information relating to the underlying project. The theory is that as we issue the LTX token and use the funds to build the laundry business, the value of the LTX will go up (on anticipation of a successful launch) and so LTX holders will enjoy the benefits of capital gains. On the other hand if the project begins to struggle and bad news enters the media, the value of the LTX will begin to decrease and LTX holders will suffer capital loss.

In order to ensure that the economics of the LTX works as an "appcoin" the issued tokens need to be convertible for their intended purpose of receiving laundry services i.e. holders should be able to take their LTX to any of the shops in the laundry chain and pay for required services. LTX can be divisible into subunits, but for simplicity in this example when a single LTX token is redeemed in a shop it is converted to laundry credits equivalent to the market rate in USD. Therefore, if 1LTX is now being traded for $50, then on redemption at the shop the holders can gain access to $50 of cleaning credits e.g. they can clean five jackets where the cost of cleaning is $10 per jacket. As the value of the tokens goes up, on the open market, holders can gain more laundry credits "for free" on redemption i.e. more jackets cleaned for the same units of tokens. Sound convoluted? Well this is simplified compared to how the Gnosis tokens work, where GNO=LTX and WIZ=laundry credits!

Token Fundamentals

However, the economics of the ICO and digital token model needs to be viable to ensure sustainability i.e. a token skyrocketing in value may be damaging in subtle ways to the issuing business compared to the obvious issues of a token plummeting to zero. To build a basic framework for such analysis it is important to begin with reviewing some fundamentals related to tokens.

Monetary Policy

A token's Monetary Policy refers to the model for supply release and the cap on total supply--how many tokens are issued and how often, and what the total number of issued tokens will be. A capped and well-controlled supply release increases the chances of a small increase in demand driving token prices higher. Normally the monetary policy would be predefined as part of the issuance strategy, where a fixed number of tokens are created and issued. However, even though there is a total supply cap the issuer would only distribute a certain fraction of the available tokens to raise a fixed amount of capital for executing the business plan. The remaining tokens are then held in an "escrow" type service to finance operational costs or future connected projects. For example, in the previous case of the laundry LTX ICO the supply was capped at 1 million tokens, and then we may only distribute 500k LTX tokens and keep the remaining in an escrow account, which we can use to cover costs of running the business and or expanding laundry shops in the future. The escrow account would likely have some form of access/usage controls to provide comfort to investors that the tokens held will not be dumped (sold in one go), in turn causing a price crash; or they may be locked for a fixed period to allow sale in a controlled manner over a "sufficiently long" period of time. All of these aspects fall under the monetary policy of a token as they are related to directly managing the supply of tokens in circulation, and is a relatively well-understood concept in cryptocurrency.

Fiscal Policy

It is also important to understand and define the commercial benefits the ICO participants gain from holding tokens, beyond just the capital gains related to scarcity. This point is a key one, and one that is least talked about and or understood, but is just as important as a token's monetary policy. In the case of the laundry ICO earlier, as we are ultimately developing a business we want to maximize the value being created so we will potentially offer laundry services in the issued LTX but also in USD fiat currency (and even in other cryptocurrencies BTC, ETH and ETC). Linking a commercial benefit (e.g. discounts) with token usage means customers would be more likely to access our services through LTX rather than any other form of payment, this is especially true if there is a large supply of tokens in circulation (resulting in less scarcity).

To drive continued customer interest in buying LTX, as issuers we can ensure that LTX holders always gain some benefits/discounts on the services offered e.g. rather than cleaning costs for a jacket being $10 the LTX holders may only pay $8. This discount may be adjustable so we can manage commercial benefits based on levels of external competition, changes in operational costs and other unknown factors. This becomes a way of managing the flow of the issued token without taking drastic actions related to monetary policy e.g. increasing/decreasing supply from circulation or even hoarding/dumping tokens. This control of flow of tokens and impacts on aggregate supply and demand is a form of "Fiscal Policy". The fiscal policy actions highlighted in this paragraph are not directly connected to managing the supply of tokens in circulation but rather connected to managing the flow of tokens through indirect economic incentives. Such flow management strategies could also lead to possibilities of market abuse, therefore their setup and execution would need to be a key issuance consideration - similar to the controlled release of excess tokens held in an escrow as part of the monetary policy.

One example of the benefit of a fiscal policy mechanism is that an issuer can propose to increase the commercial benefit (e.g. cleaning discount in LTX), which will increase aggregate demand of the tokens (from D1 to D2 in diagram below). Such an action can then be combined with monetary policy decisions, for example as the aggregate demand of the tokens increases through the fiscal policy decisions, the issuing company could then also release further tokens, that may be held in escrow, increasing the total supply in circulation (from S1 to S2 in diagram below). This combined increase of supply in circulation and the demand due to increased commercial benefits may have a minimal impact on the current market price. This simple thought experiment can be visualized as in the following diagram:

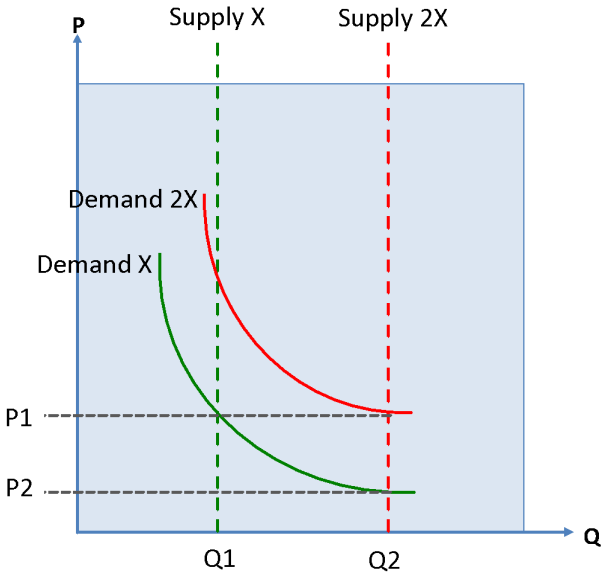

Figure 3 : Aggregate Demand Curve Shifts

This model, taking into account monetary and fiscal policies (which are fundamental in macroeconomics), and applying a framework, which allows them to interact, and affect aggregate supply and demand, shows how critical these policies are to understanding ICO structure, tokens, and their impact on future issuing projects/companies and the capability for value creation and risk causation for token holders.

Supply and Demand

As seen above, from a monetary policy and fiscal policy perspective, the balance of Commercial Benefit and Supply Scarcity factors is critical in planning the issuance of a sustainable appcoin and the impacts on a business (see the diagram below). The economic analysis for such a balance can be modeled through assessing the supply and demand surfaces based on these explanatory factors. As a thought experiment it is viable to assume that highly scarce tokens with very high commercial benefit (e.g. offering steep product discounts) may result in hyper deflation of their value, leading to a hoarding mentality, as there will be a view of “falling prices” or being able to purchase more with the same tokens if token holders delay redemption. While this may seem like a positive effect, as a higher purchasing capability of a token implies higher returns for a company when they sell a redeemed token back into the market, such a scenario also has the potential to detrimentally impact a business and its cash flow.

One of the most obvious impacts is that whilst a hoarding mentality will result in people delaying the use of their tokens, accordingly customer perceptions of using fiat currency to pay for services could cause them to feel like they are getting a worse deal compared to buying with a token, hence driving them to also delay their purchase, or use substitutes and or competitive products/services. This business slow-down will, in turn (assuming an efficient market), lower the value of the token until an equilibrium point is reached. However, the equilibrium point may not be what makes this a highly profitable business. On the other hand, tokens with low scarcity and minimal commercial benefit may

be of little interest to users either as “investments” or for access to services. Evidently there is a level of complexity here that is very challenging to assess without some historic and forecast sales revenue/cost data related to a company’s core product or service and its customer profiles.

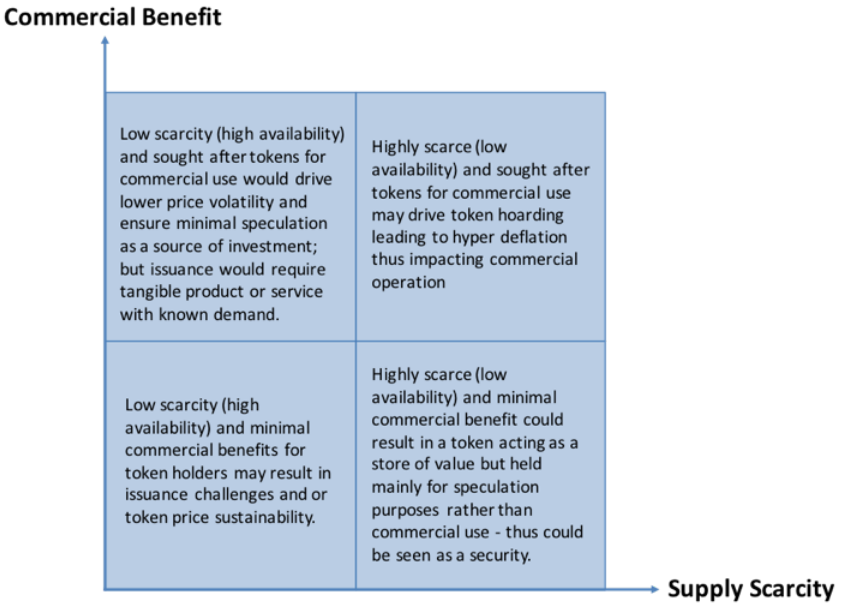

Figure 4 : Benefit and Scarcity Matrix

The Optimal Model

From an issuer perspective, as the tokens are redeemed by holders for their relevant commercial purposes, for which they may receive company credit (e.g. coat cleaning in the laundry example) the company can resell the token in the market at the current market rate. Using this approach the company can recover operational costs and generate profits. This cycle of token purchase and redemption by customer and resale into the market by issuer can continue, meaning the tokens would become a form of money that is only locally accepted by the issuing company. From this context it becomes apparent why the above framework considering monetary and fiscal policies and their interactions makes sense, as *“a long line of research emphasizes that separating monetary and fiscal policies overlooks policy interactions that are important for determining equilibrium”* [16].

As a token model, the above may be the most viable basic structure where an ICO makes business and economic sense. Conversely, an example of a nonsensical token structure would be a 1-to-1-access model wherein the issued tokens are just for single-use only, then their market value would intrinsically be capped at the value of substitute offerings. For example, if 1 token represents 1 unit of service, and competitors charge $10 for the same service (all other things being equal), then it is irrational for token purchasers to pay more than $10 for one token on the open market (assuming no commercial discount for token holders).

In addition, issuers must account for the time it takes to sell the token in the open market after being redeemed by a token holder for its intended commercial purpose. In a sufficiently liquid market this may be “instantaneous”, thereby minimizing the risks associated with price volatility. From a commercial perspective these risks could be severe because hoarding tokens to control market supply may backfire if token value falls. In this scenario the issuing business may not be able to sell the tokens it holds to recover costs incurred delivering the services in return for redeemed tokens. While risks can be hedged if appropriate instruments/services are available, the optimal model would see smaller companies refrain from hoarding, instead preferring to sell in sufficient quantities to at least recoup costs. This is also the model used by blockchain miners.

Leading on from this is the challenge of “retiring” tokens, for example if an issuing organization at some point in the future decides to discontinue a particular product/service, or move away from a token model. In this scenario the token holders can effectively be seen to have some form of right or vote on the future of the product or service offered by the company! This challenge becomes greater than just a simple vote because as the value and or usage of these tokens increases, the holders will be seen to have more influence over company decisions. The optimal and simplest approach would be for the issuing company to buyback the tokens from holders at the market rate; a process which must be managed appropriately so that any announcements and buyback processes will not result in liabilities for the company. In this context, it must be noted that retiring any form of “money or security” from circulation (if these tokens are thought of as such) is a huge challenge. On a much larger scale this is evident in the issues that occurred in India with the heavy-handed banknote demonetization strategy in 2016 [17]. In the case of a digital token the scale would be much smaller, but as a company grows and token values and or usage increases the challenges could be similar, especially when the tokens represent some form of access to a product or service that people have become attached to, or is critical to operations for which they still require some form of support from the issuing company (think Windows XP). A prudent way to manage this would be to have a buyback/demonetization strategy as part of a token ICO, and even some functionality to manage this autonomously in a controlled manner.

Viable and Non-Viable ICOs

As we saw previously executing an ICO, issuing tokens and managing the micro/macro-economic impacts on the business, key stakeholders and the market will mean companies in the future may not only need a CFO but likely also a Chief Economist, as running such a firm will be akin to running a small country! This will be more of a problem for a startup or a fledgling company, but maybe not so for an ICO executed by a larger firm with a more established product or service.

If a large, established company e.g. Spotify, Netflix, and even PornHub (given its category’s historical influence in driving new innovative business models [18]), executed an ICO and issued a token, for managing operating costs or expansion of services, it may make commercial and economic sense to do so. In this scenario the economics can likely be modeled with an acceptable level of confidence due to good availability of sufficient historic and forecast operational and financial data. Therefore, an appropriate token structure can be setup and deployed for the ongoing benefits of participants and sustainability/growth of issuer’s business model.

In a startup context a token ICO for a non native digital asset (i.e. that is intrinsic to a blockchain infratsucture such as bitcoin or ether) would likely only make sense commercially/economically for a series A (or otherwise early round) when a decent product-market fit has been defined and scale up capital is required. From this context it can be seen how a token ICO model may even be hugely disruptive for later stage venture capital firms, contrary to their current views [19].

In either of these cases, for established companies and or scale-up firms, the key question then is why do an ICO on a public blockchain if the tokens are not securities? If we’re not dealing with securities and such assets can be easily and widely marketed to retail investors, and the token life cycle can be managed without the challenges of complex client money and asset rules, then why use a decentralised infrastructure solution to execute an ICO? Why not just use cryptocurrency payments such as bitcoin (or any form of payment) with the token mechanism managed through a centralized system? One of the key reasons that comes to mind for executing an ICO is the potential to leverage current regulatory arbitrage opportunities, that enable risky issuances to be openly marketed to a wide audience with minimal controls. In addition, the potential for liquidity of such asset through an established crypto exchange and or the OTC market makes such issuances even more favorable for pure speculation by investors in a highly risky company or project.

Why do we Need This?

If everyone starts to issue their own tokens, does that mean we will start paying each other in private money?

“I’ll give you 2 laundry tokens for 1 haircut token.”

Very unlikely!

Money was invented because bartering isn’t a particularly efficient means of paying for goods and services. While this should be obvious it hasn’t stopped idealists and opportunists trying to bring back the concept through “new and revolutionary” business models — some of which scarily resemble the current token/appcoin hype!

With the growth of the internet in the 1990s and 2000s there was a sporadic resurgence in the concept of bartering. But many platforms that attempted such models disappeared as quickly as they emerged. An example of one that launched in 2005 and persevered for a number of years was PeerFlix, which was a platform that enabled users to exchange DVDs. CNET summed it up nicely [38]:

“Essentially, it's Netflix with no centralized processing center. Actually, that's not true. It's more like an open-source version of Netflix, with users sending their own DVDs to other members instead of everyone borrowing from the company's massive library of movies. The idea is that collectively, users have the movies that everyone wants. So, if one user has a copy of "Pulp Fiction" and another member wants to borrow it, the first sends it off to the second. ”

Peerflix tried to overcome the limitations of bartering. One of the key issues was associated with the “Coincidence of Wants” i.e. not having exactly what someone wants with whom you want to barter [39]. Peerflix attempted to solve this problem by introducing their own token called “Peerbux”, with which users could pay for DVDs rather than doing an outright exchange. This native token was used as a medium of exchange on the platform and could be bought for fiat currency or earned by sending DVDs to other users. Before you say how contrived, reflect on how you stand with ICOs/tokens first!

By early 2008 Peerflix shut down, apparently as people realised that [40]:
“when you have to trade DVDs straight up, there are going to be a lot of crappy DVDs available, and not many good ones. It doesn't take an advanced economics degree to figure out why”.

One of the key lessons we can learn from this is that having a native digital token is senseless when the economic structure of the underlying market is fundamentally flawed. In the case of Peerflix the flaw is simple, and is one Ebay knew very well. Ebay realised it could not fulfil user demand with the highly limited supply of used goods. The inelastic supply of used goods meant that as demand for a product increased the auction prices increased to a new equilibrium, however there is a limit to how much a user is willing to pay for a used item i.e. there is a point where a user would rather buy a new item than pay above a certain threshold for a used item. Ebay’s original model works well for antiques, where there is no more supply of new items, but it does not work well for generic mass market items. Ebay knew it needed to expand into a wider marketplace model that also offered new goods; this way it could fulfil user demand and compete effectively with the likes of Amazon [41].

Peerflix did not fulfill its market’s fundamental needs, instead it focussed on simplistic ideas of solving problems that people really didn’t care about. Which resulted in Peerflix being eaten alive by Netflix!

So while native digital infrastructure assets, such as bitcoin or ether, are fundamental innovations as a decentralised store of value, medium of exchange and potentially a unit of account, their value can also be seen to stem from the frictionless markets they enable to be developed atop of their decentralised networks. Leveraging the core benefits of these native digital assets means that developers and entrepreneurs can focus on solving the real problems of inefficient markets they are

trying to tackle. By adding contrived secondary tokens, merely for the purposes of fundraising through regulatory arbitrage, is a potential sign that the market model being deployed may be contrived and of no extra value at best and potentially ineffective and destroy value at worst.

This view of a contrived market can be further reinforced when we look at the complexities/risks being added to a startup's operations with the introduction of tokens. In cross border businesses hedging FX risk is a common practice, and introduction of a "global currency" such as bitcoin/ether can be considered as one of the key aspects of eliminating/mitigating such risk. However, then adding secondary tokens, and introducing FX risk again between a network's native digital cryptocurrency and an application token, means businesses that either offer or use such tokens will need to hedge such exposure to run a successful company. Without hedging running a sustainable/successful business will be like running a trading book! Therefore, the key question becomes, what benefits can be so great with application tokens that we would we want to add price uncertainty and hedging complexity and cost? This is a complex point, which we will explore in detail in future work.

Such complexities are not easy for token investors to assess, in particular where projects are marketed as "infrastructure layers" and or "open source technology", and accompanied by a high-level white paper with little or no technical specs or economic analysis (qualitative or quantitative) that demonstrates an understanding of the market.

This lack of depth and structure would be equivalent to a startup or even a non-profit raising traditional financing/donations without providing a viable business/operating model, disclosure, and a deep understanding of their market's economic structure and dynamics. An interesting question is, while many people would not accept such a level of inadequacy in a "normal" funding processes, why are they willing to turn a blind eye when it comes to an ICO process? This is a complex questions, and will be tackled on a more macroscopic perspective of market dynamics in the next part.

What Next for ICOs

We must highlight that while the overview provided in this work is speculative and dares to touch on complex elements through a conceptual "thought experiment" approach, it is based on sound commercial and economic reasoning. Similar reasoning can also be seen through the quantitative framework proposed by Bolt and van Oordt, in their working paper: "On the Value of Virtual Currencies" [20]. Their work highlights that the equilibrium exchange rate of a cryptocurrency (and digital tokens in general) depends on key factors related to the supply and flow of tokens. This is demonstrated through a quantitative model based on: (i) active use of tokens to make real payments for goods and services, (ii) effective supply reduction through speculative hoarding, and (iii) drivers for consumer adoption as a means of transaction.

However, even with all the fancy conceptual and quantitative models the fact is that ICOs and tokens are a new phenomenon and while we may not have the benefits of the Pachinko Parlor industry to look outside of our little bubble and see what could be possible, we have our imagination, logic and intellectual honesty to determine what is happening in this industry and where it can go. Many are trying hard to believe, as well as convince others, that ICO tokens are just like reward-based crowdfunding or software licences in order to distance the issued tokens from financial securities and or other forms of economically complex financial innovations, only for the purposes of abstracting legal and regulatory burdens; and such abstractions are likely to increase in light of recent SEC announcements [1]. This may result in some short-term gains but the chances are this may lead us to miss a much (much) bigger opportunity or even delay a ticking time bomb.

The mental model developed for ICOs and tokens in Part 1 will be developed further in Part 2 to look at key macroscopic market dynamics, how they can impact the perceived value of tokens and what this can mean for market stability.

Part 2: ICO Market Dynamics

In Part 1 we set the scene on establishing a mental model for understanding ICOs and tokens on a microscopic level: defining the purpose of a digital token and the ICO distribution model, a token's issuance structure and the potential impacts on its fundamental value. In this part we will focus on a macroscopic perspective by looking at the dynamics of the overall market, and using that to assess what could be happening in the current market and where it could lead to. To do this we will look at the basics of economic theory underlying social networks and markets. In particular, the factors that make "the wisdom of the crowds" less, well, wise, and how dubious market experts can make short term gains in either up or down markets by selling lemons!

In the best case scenario we can potentially leverage this model to understand and define a framework for a stable market - until regulators step in to enforce stringent controls that go beyond the high level guidance currently provided by the SEC.

The Problem with Crowds

Before we go into market behavior, let's bust a myth. One of the key driving forces behind crowdfunding type financing models, such as those underlying current ICOs, is their reliance on the "Wisdom of Crowds". This is where proponents highlight that the collective decision making capability of a crowd outweighs the capability of any one person. Therefore, such concepts are used to support why crowdfunded ICOs have the capability of selecting winners much more efficiently and effectively than traditional funding models e.g. through VCs. However, this misses a very crucial point and lacks an adequate understanding of the deeply statistical foundations underpinning the concept of Wisdom of Crowds.

Wisdom of Crowds is a framework for aggregating a diverse set of views from entities that are independent and decentralised, in order to arrive at a view that is closer to the truth than that of any one entity. This is based on the statistical concept that if you have a sufficiently large number of inputs all with differing points of view, you can take the statistical average to cancel out the noise and arrive at the truth. Using language from experimental science, this is known as the process of reducing "random error" that is always present in complex systems. However, there is another error that can be more elusive and challenging to manage. This is known as the "systematic error" or statistical bias. Such errors can skew all inputs by the same amount, so while the overall aggregated result reduces the random error of the inputs through the process of "averaging", all the inputs can be skewed by the same amount and thus the average will also be skewed. The ideal state would be to minimise both random and systematic error in order to ensure our results are both precise and accurate (see diagram below). However, while being less precise (uncontrolled random error) can show us something is clearly wrong, being less accurate (uncontrolled systematic error) can lead us into a false sense of security. This is why systematic errors (bias) are the bane of any good experimental scientist!

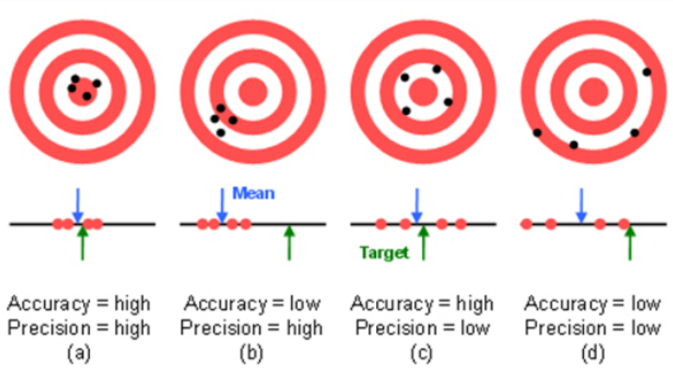

Figure 5 : Error Types
(a) Low Random and Systematic Errors
(b) Low Random but Large Systematic Error
(c) High Random but Low Systematic Error
(d) High Random and Systematic Errors

Conditions for an Effective Crowd

In the context of wisdom of crowds, we have four key conditions that need to be satisfied for effective crowds, where we can ensure we can average random errors (be more precise) and minimise systematic errors (be more accurate) to arrive as close as possible to the truth through the wisdom of the crowd. These conditions are [22]:

1. **Diversity:** entities should have access to private information that they use to interpret known facts related to the truth that is being deduced.
2. **Independence:** entities should not be influenced by leaders or susceptible to herding factors such as social pressure and FOMO.
3. **Decentralisation:** entities should be separated to ensure both diversity and independence are maximised.
4. **Aggregation:** there needs to be a mechanism for collating views from all entities to provide a statistical average.

Social Influence and Crowds

We can argue that underlying efficient markets are social networks, however it can also be shown that not all social networks enable efficient markets [23]. This comes from the view that while social networks can provide efficiencies in unimpeded transmission of information, establishing trust etc, badly incentivized social influencers who dominate the dissemination of biased/skewed information, can undermine the wisdom of crowds. The experimental impacts of this are discussed in the work "How Social Influence Can Undermine the Wisdom of Crowd Effect" [24]. This work highlights that *"social groups can be remarkably smart and knowledgeable when the averaged judgments are compared with the judgments of individuals."* However, it is shown that social influence effects can diminish the diversity and independence of the crowd, thus skewing the statistical aggregate and deteriorating the resulting collective wisdom of the crowd. In this way crowds can be considered as acting as a collective (or a mob), where group thinking ensues rather than diverse, knowledgeable and informed individuals acting on personal points of view.

What does this mean from an ICO perspective? When there are high profile ICO advisors with large followings on easily accessible social networks, who are incentivized inappropriately to market products irrespective of quality, this can often result in crowds becoming less effective. This social influence in markets becomes even more damaging when there is information asymmetry, and a lack of a market mechanism to ensure transparency and minimize predatory and outright criminal behavior. So, when you have a market where most of the information is controlled by one side of the

market, as in the case of issuers of ICOs, and the market has strong social mechanisms for information dissemination, we can end-up with a case of “adverse selection”, that can lead to market instability. This phenomenon may be afflicting the current ICO market, where people start off by chasing dreams of getting rich quick but just end up holding lemons in the longer term!

Market for Lemons

What would happen if buyers of a particular product couldn’t tell the difference between good and bad quality products? It would be fair to assume that sellers would try and push their products as good quality in order maximise their returns. In this case of information asymmetry only sellers know the real quality of their products. We can then assume that uninformed or unsophisticated buyers will begin acting on overall market sentiment where the quality of the products are expected to be somewhere between the good and bad quality products i.e. there is uncertainty in product quality. What effect does this have on the market for a product? This is exactly the phenomenon explored by economist George Akerlof in his seminal paper published in 1970, ‘The Market for Lemons: Quality Uncertainty and the Market Mechanism’ [25], for which he jointly received the Nobel Prize.

Akerlof used a simple thought experiment related to the used car market in the United States, in which he quantitatively demonstrated the impacts of information asymmetry on the equilibrium state of a market. A high-level qualitative overview of his argument is as follows:

- In American slang a “lemon” is a car that is found to be defective after it is bought.
- Suppose buyers cannot distinguish between a good quality car and a lemon, therefore they are only willing to pay a fixed price for a car that averages their value i.e. prices will be between good quality cars and lemons.
- Sellers know whether they hold a good quality car or a lemon i.e. they have more information than buyers, but there is no way for buyers to know whom to trust.
- As buyers will only buy at a fixed average price, given quality uncertainty, means sellers will only sell when they hold "lemons" since the price of a lemon is less than the average sale price.
- On the other hand, the fixed average selling price means that sellers will leave the market when they hold a good quality car, as the average sale price is less than the true value of the car they have for sale.
- Eventually, as enough sellers of good quality cars leave the market, the average sale price for cars will decrease as quality deteriorates.
- As the quality continually deteriorates eventually sellers of average quality cars will also exit, leading to further reduction in the average selling prices.
- This continual lowering of the average sale price and resulting deterioration of quality leads to a downward cycle until the no-trade equilibrium is reached i.e. buyers cease to buy as they will expect only lemons.
- Thus asymmetric information and the challenge of uninformed buyers making decisions based on general market sentiment rather than individual informed views results in the *Adverse Selection Problem*, driving good quality cars from the market and potentially leading to a market collapse.

This is obviously a highly simplified view of how markets operate; however it clearly illustrates how the interactions between variation of quality and asymmetric information can potentially lead to the disappearance of a market where guarantees are indefinite [26].

It must also be highlighted that The Lemon Market model is not a completely abstract thought experiment. One of the most prominent examples of its application was seen during the financial crisis between 2007-2012 [27]: *“Banks wanted to offload toxic assets. But they had better information than the market did about how toxic their assets were. The markets therefore discounted heavily what the banks offered for sale, so heavily that the Banks didn’t offer good quality assets for sale. But knowing this, and not wanting to buy worthless assets, the markets withdrew.”*

Conditions for a Lemon Market

Akerlof's simple but effective model of the impacts of information asymmetry on a market can be broken down to a number of conditions that can potentially lead to a lemon market:

1. **Information Asymmetry:** buyers cannot accurately assess the value of a product through examination before a sale but sellers can.
2. **Skewed Incentives:** An incentive exists for sellers to pass off low-quality product as higher quality.
3. **Lack of Disclosure Framework:** Sellers have no credible disclosure mechanism, so good quality is difficult to differentiate from low quality.
4. **Low Quality or High Variation:** There is a high variation of seller qualities or the average seller type is sufficiently low quality.
5. **Lack of Assurance:** There is a lack of quality assurance either through reputation, guarantees, regulations or other clear legal protections.

Trust in a Lemon Market

The interesting thing about Akerlof's work is that he didn't just leave us with a problem and no way of preventing or minimizing it. A key part of his work is the importance of trust for market stability. While he touched on how informal unwritten quality guarantees can be preconditions for trade and production, such as reputation and brand recognition, he also pointed to how formal licensing/regulations and other clarity around legal protection can help reduce uncertainty [25]. In this case there would be no adverse selection problem because an asset's fundamental value would be known with some level of certainty.

Interestingly, five years after Akerlof's paper was published, the United States put in place a federal "Lemon Law" (Magnuson–Moss Warranty Act), and each state now also has laws that provide remedies to consumers for automobiles that repeatedly fail to meet certain standards of quality and performance, although these are not necessarily applicable to used cars that don't have a warranty [28].

From Lemons to Bubbles

While Akerlof showed that in the extreme case a market subject to the adverse selection problem, resulting from information asymmetry, can lead to market collapse, such market "implosions" are not common, and something subtler takes place.

Douglas Emery took this adverse selection problem further and showed that a market that is under the "lemon" conditions will not necessarily collapse, but will go into what he referred to as a "negative bubble" i.e. where an asset will eventually be traded at a price that is below its fundamental value.

Emery demonstrates in his work 'Negative Bubbles and the Market for Dreams' [29] that *"as an asset's market price falls to a sufficiently low level, the potential value from buying the asset increases to a sufficiently high level to attract non-experts to purchase the asset – in spite of the risk of getting stuck with a lemon. Therefore, rather than a market collapse, assets in such markets can often sell for less than their fundamental value."*

The key conclusion of Emery's work is that while adverse selection can lead to a market collapse this is not always so, in reality a "negative bubble" is more likely, where buyers can pick-up bargains. However, Emery extends this to show that a mirror image of negative bubbles can occur under certain conditions, where assets can start trading above their fundamental value - leading to positive bubbles. A condition that is more prevalent in markets compared to negative bubbles.

Emery demonstrates that information asymmetry and skewed positive market perceptions can lead to assets trading above their fundamental value. This can can persist until all assets owned by experts have been sold to non-experts. In a more perverse situation the experts can then start to change their strategy and leverage market momentum to profit from short term investment horizons e.g. intraday trading. Therefore, assets start trading increasingly above their fundamental value, which can be considered a result of "experts exiting the fundamentals market", or in other words those "in the know" trading on short term horizons and those "who don't" holding for the long term. Eventually as an increasing number of market participants, experts and non-experts, start acting on shorter term investment horizons, severe distortions occur in the perceived value of assets, thus leading to an unstable situation and the formation of a positive bubble (diagram below).

Positive bubbles will persist until the short term investors, mostly the "experts acting on short term horizons", completely exit the market, potentially due to negative news either directly or indirectly related to the market, which leads to a bursting of the bubble. In such situations, the last ones left holding the assets are normally the investors acting on medium/long term horizons, and who may also be least able to afford the losses [30].

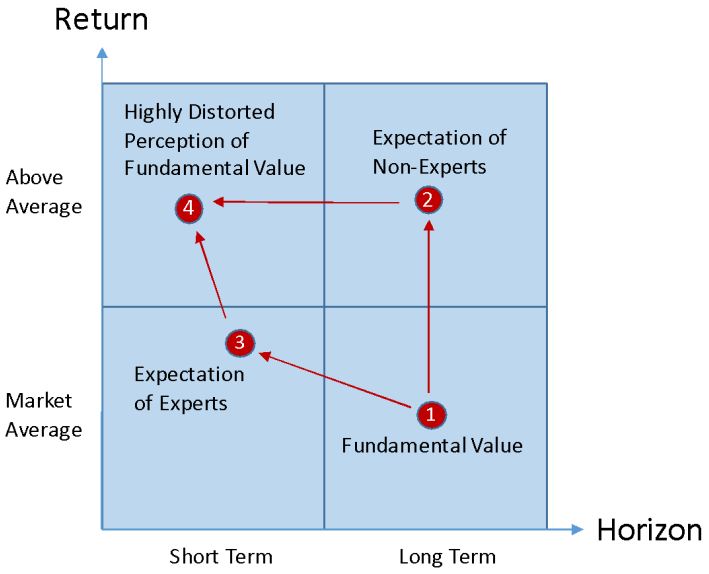

Figure 6 : Market Dynamics Based on Return and Horizon Preferences

Beware the ICO Lemons

Our foray into market dynamics and stability shows us that conditions that lead to lemon market scenarios may result in market collapse or more likely a negative bubble, but if such conditions are accompanied with positively skewed market sentiment e.g. rising asset values, a positive bubble can ensue where buyers chase dreams. Ultimately, Lemon Market conditions, with skewed market perception, makes it difficult for buyers to determine the fundamental value of an asset, thus distorting the market and driving instability. Using this mental model, we can assess how each of the Lemon Market conditions applies to ICOs and tokens, and what context this provides us of the current state and an optimal path forward.

Information Asymmetry

Buyers cannot accurately assess the value of an ICO token through examination of the project details before a sale but sellers can. The concept of ICOs is not complex, it is just about users exchanging one asset (cryptocurrency such as bitcoin or ether) in return for another asset (tokens), which they believe will have higher value for them in the future e.g. through financial gain or utility by accessing some "decentralised" product or service. This is like an initial public offering (IPO) of financial assets, but here the asset is a novel instrument that has little or no precedence for comparison or valuation. In most cases the issuing organisations do not even have a product let alone established product market fit, so models for supply/demand are few and far between. Ultimately the only tangible basis to assess any form of utility and hence value offered by these assets is based on what the issuer provides, either through a white paper or other forms of communications.

In this context, the flow of information is mostly one-sided, from seller to buyer, and in many cases social influencers are leveraged to maximise on the overall hyped market sentiment that "cryptocurrencies are on an upward trend". Therefore, the token buying public, who may know little or nothing about the issuing organisation and the technical concepts behind the offering, can only trust that the issuer and its spokespersons are truthful, competent and committed to delivering what is stated. No one, apart from the issuer can truly know the answer to this, and as the issuer has no fiduciary duty to the token holders, they can pretty much say anything to maximise interest in the ICO and the ongoing demand for the issued tokens!

Skewed Incentives

One of the key consequences of a lack of accountability and a minimal time/financial cost associated with executing an ICO is that there is a clear and indisputable incentive for issuers to pass off low quality products as high quality ones. Skewed incentives enable issuers to disproportionately profit from a particular behaviour as the potential gains outweigh any direct risks. Some of the key skewed incentives are as follows:

- Perceived Zero Accountability: Issuing companies currently have a sense of zero accountability for claims made during an ICO process. This is supported by detailed disclaimers and small print.
- Limited Ongoing Responsibilities: In many cases an ICO is structured to appear as an "open source infrastructure layer" and the financial contributions are deemed to be donations made to an abstract "non-profit" co-operative, even though an incorporated company may be used to deliver key solutions. As such the ongoing value of issued tokens is considered to be unconnected with the efforts of the delivering organisation or the team members linked to the ICO, and the ongoing performance is considered as a community responsibility.
- Minimal Cost and Complexity: There is a minimal upfront cost and complexity to execute an ICO, with biggest cost being time to build up a community following and draft a white paper. Driving a community following can also be accelerated at minimal cost by leveraging social media influencers who feel there is very little accountability and or reputational impact on them if things go wrong.
- Minimal Technical Requirements: Due to lack of requirements for a minimal viable product and or detailed technical specifications, technical barriers to entry are only limited to convincing and recruiting advisors and claims of future hires with key skills. In many cases key technical contributors are sought who provide "reputation as collateral" [31] to legitimize the offering and signal to consumers the capabilities behind the ICO.
- Scarcity and Liquidity: Implementing a monetary policy that is based on token scarcity and with a liquid secondary market, combined with implied claims for demand of tokens for access to future products, there is a perception the issued tokens could increase in value in the short term and early buyers can sell out. This drives a fear of missing out (FOMO), and hence higher initial demand for the ICO digital token.
- Perceptions of Growth: The industry currently has a positively skewed perception of the ICO phenomenon and cryptocurrency in general. While there is a growing sentiment that the market is reaching a peak, at which point either regulators will step in or buyers will start exiting due to over

inflated prices for subpar tokens, there is still a view that short term token investors can make a quick gain and pass on their holdings to unwitting long term investors on a liquid secondary market before the bubble pops.

Lack of Disclosure Framework

Like most industries in their infancy there is little or no disclosure requirements for minimum standards on type, structure and quality of information provided for an ICO process. In addition, any information that is provided, normally through a simple whitepaper, undergoes no third party review for assurance on accuracy, currency, reliability and correctness of disclosures. In many cases, in particular for the larger well organised ICOs, whitepapers come bundled with numerous disclaimers and waivers, which make any information contained in documents next to useless for gaining an accurate and truthful state of the project, as the project owners pretty much absolve themselves of any accountability and or responsibility, the equivalent of using the term "as is" on the sale of a second hand car! Finally, any future action by holders of tokens may be futile as projects can also contain small print such as: "...CONTAINS A BINDING ARBITRATION CLAUSE AND CLASS ACTION WAIVER, WHICH AFFECT YOUR LEGAL RIGHTS."

In a world where assessing risks is hard enough as it is, doing so for an early stage company or project is even more pronounced. Therefore, in these cases a robust or trusted disclosure mechanisms is normally a key barrier to manage risk. This could come in the form of mandatory information audits through a trusted source, which would then be supported by some form of ongoing disclosure (e.g. financial reporting) to ensure a project is managing its finances and risks prudently and meeting key milestones. Such frameworks would enable sellers to differentiate themselves and their good quality (credible claims) from low quality (inflated claims), and thus ensure some form of accountability and responsibility when it comes to transparency. However, such disclosure frameworks are unlikely to be viable for most early stage companies and projects, as any startup investor or entrepreneur can testify to. For a project owner to truly provide information that can differentiate the quality of their project in this industry is mostly through a working product/service and some form of market traction… maybe this is why Satoshi Nakomato released a product rather than doing a crowd fund on a white paper!

Low Quality or High Variation

There is no doubt that there is significant variation in the quality of ICOs. However, what is not so obvious is if the average quality across all projects is low. To make things even more complicated it's also unclear how to actually quantify quality.

If we start with the assumption that in most ICO cases there is little or no product let alone a product market fit! Therefore, focusing on other tangible aspects, such as marketing material and project details related to current issuances, we can see there is significant variation in relative quality, which can be seen in the writing style and technical depth of whitepapers, quality of websites, social media communications, and most prominently in the skills and experience of the teams and advisors. There are obviously some well financed projects with major backers, which can afford the development of quality marketing material and hire experts in communications and legal matters. But like in any early stage investment, this is no firm indicator of a viable project or of a project that has a higher than average survival probability. As one VC noted (who shall remain anonymous), such factors normally make it harder to identify the real quality, or as he put it: *"such shallow niceties are like polishing a turd for a beauty pageant!"*

The truth of the matter is that there is currently a lack of data related to how quality can be determined for early stage projects in general, let alone ICOs, and if such funding mechanisms gain wider adoption we will see over time how the survival rates pan out for various project types. Using simple rules of thumb, as for traditional early stage equity and debt deals, investors normally attempt to qualify a project based on fundamentals such as product, team, market and in many cases on basic financials. While financials are pretty arbitrary for many early stage projects, they do provide a

level of robust thinking on how value is created by the product or service, the business model that may be leveraged to commercialise that value, and how the size and competition in the market will influence the trajectory of operations and commercialisation. As noted, this can be a “finger in the air” process for early stage projects, but it does provide a somewhat structured framework to define a possible roadmap and key milestones, which can then be modified as further information comes to light as a startup progresses - akin to a hypothesis driven scientific process. However, such structured thinking is rarely (if ever) applied to ICO issuances, in particular for cases that are oddly marketed as “non-profit” and or “infrastructure” yet the issuing company may also be developing proprietary end-point applications that can plug into the “open-source” layer (which is often nothing more than a simple smart contract).

In general, within the ICO world, there is little or no economic analysis on the optimal monetary policy (supply release and cap) and fiscal policy (commercial benefits for holders), thus the current issuance structures are mostly based on what would drive an initial rush of investor interest with little thought of managing ongoing supply and flow. This is essentially like an early stage equity/debt investment being executed with no justification of valuation or returns based on possible market size and or demand for the product (even if such numbers may only provide an arbitrary baseline). Based on this thought process, even though we will likely have to wait a number of years for project failures to crystalise, we can say with a certain level of confidence that the depth of economic analysis performed for issuing digital tokens will likely be a sign of quality, and right now this at an all time low across the board!

Lack of Assurance

The lack of assurances by issuers is one of the key points of the ICO token market that makes it a form of regulatory arbitrage. If funds were raised from a number of investors for an early stage project through a securities issuance, there would be a substantial amount of protection for investors. However, digital token issuances executed through an ICO come with numerous disclaimers and little or no guarantees, as highlighted in the Lack of Disclosure Framework above. There is a deliberate perceived distancing of responsibilities and accountabilities of the issuing persons and organisation from what is delivered and the value of the token being issued.

The lack of assurances combined with the skewed incentive structure discussed above provides a combination that can lead to companies (deliberately or through carelessness) driving up the perceived value of the tokens through grandiose statements, but at the same time absolving themselves of any responsibilities of the token’s market performance if such claims are not fulfilled.

So is it a Lemon?

If we have a crowd that is socially influenced, a market that suffers from skewed asymmetric information and little or no controls or assurances we will likely see assets trading outside of the bounds of their fundamental value. In such cases it is highly likely a positive bubble will persist until there is some abrupt news that forces “experts” to exit the market, which will leave “non-experts” holding assets at an inflated value. Without previous trading volumes to support the inflated value, asset prices will begin to drop until they are at or below the fundamental value. To some extent this simple mental model was highlighted by Hyman Minsky in his work “The Financial Instability Hypothesis” [32], albeit from a wider economic context where periods of prosperity encourage greater leverage and progressive recklessness, where excess optimism creates financial bubbles and the later busts. He argued that such up and down cycles are endemic and inevitable in a capitalistic economy, which is a type of market failure and requires some form of controls.

All signs point to the ICO and token market suffering from lemon conditions, combined with the positive hype of a new technology that created a small group of early winners (in Bitcoin and Ethereum). In addition, with the lack of controls and accountability on marketing of ICOs, social influence through widely accessible and open public channels, can drive crowds to become

“ineffective”. As a result we’re seeing digital assets being created and traded that will likely never live up to their current perceived value.

However, this does not mean that market participants are “irrational fools” chasing dreams, who only end up holding lemons when the market plummets! All this means is that without a controlled environment all participants will act in their own self interest, and unfortunately the long term investors or late adopters will end up losing out as the market corrects to find its fundamental value. In many cases the fundamental value of many tokens may be zero as the market realises some projects are the equivalent of trying to create Netflix on 1995 infrastructure - where the early stages of the technology and or lack of adoption means timing is misaligned [33]!

So if lemon conditions are prevalent, there is skewed positive market perception and a surge of late adopters inflating prices, what can be done to drive market stability, or at least prevent an all out collapse? In part 3 we highlight key legal and communication considerations that can provide issuers with appropriate foundations to protect themselves and their investors. This is particularly important as regulatory conditions begin to shift and ICOs and tokens become increasingly classified as securities with little room for flexibility in interpretation. In addition, such rules of thumb can provide a simple framework for investors to judge the quality of an issuing project.

Part 3: ICO Market Uncertainties and Stability

As noted in Parts 1 and 2, ICOs and the issued tokens operate in a legal and regulatory grey area. Even the recent Securities Exchange Commission (SEC) investigative report [1] makes clear that the classification of digital tokens will need to be reviewed on a case by case basis and (in the SECs words) *"will relate to the facts and circumstances, including the economic realities of a transaction"*. In the UK the Financial Conduct Authority (FCA) has currently stated they will be taking a neutral stance [34], however they have also left the door open to use discretion on a case by case basis: *"[ICOs] have various parallels with Initial Public Offerings, private placement of securities, or crowd sales. Depending on how they are structured, they may, therefore, fall into the regulatory perimeter."*

Increasing Regulatory Oversight

Based on the growth of such offerings there is a strong possibility that in the coming years many ICOs will fall under regulatory oversight i.e. the offer and sale of many digital tokens will be classified as securities and thus be subject to stringent rules. Many contributors to the debate on the use of blockchain technology are already advocating a greater consistency in the application of existing regulations. For example, in its response to the FCA's recent consultation on the use of "distributed ledger technology", the Association of Financial Markets in Europe (AFME) argued that "*regulation should focus on the activity taking place, not the technology that delivers it.*"

Emerging Asset Class

While greater application of existing or indeed new regulation will drive increased complexity and cost for issuance of such instruments, it is also likely to open the asset class to new categories of investors and therefore a deeper pool of capital. As a result we are likely to see more regulated trading platforms emerge on which tokens can be traded from issuance and in the secondary market. Such additional regulatory burdens will begin to reduce the regulatory arbitrage opportunities that are driving the growth of ICOs and issuance of digital tokens. In such a scenario, with all things being equal, more economically efficient financing instruments executed through an ICO process may begin to gain prominence, such as debt and equity or fund-like structures. Therefore, with greater regulatory oversight of the ICO process, we will begin to see the true benefits of digital tokens (or appcoins), which could then accelerate the refinement of real use-cases rather than just being a mechanism for regulatory arbitrage. This may lead to appcoin type digital tokens becoming an asset class in of itself, that requires significantly different approaches to risk management and investor protection.

Retrospective Prosecutions

While we are operating in regulatory limbo there may be ICOs and token issuances that are mis-classified or ambiguous in terms of their status, which may later be determined to have clearly violated securities rules in one or more jurisdictions. The SEC investigative report on TheDAO is a clear example of a post-issue review. In such cases, if the impact on investors is seen as sufficiently negative, there is a chance that issuers and those associated with the offer and sale of tokens may be retrospectively pursued by multiple regulatory bodies. The chances of this happening are likely to increase as the sums being raised by ICOs increases, coupled with the increased pool of token holders who may be affected by the way the ICO has been structured on issuance and traded in the secondary markets. The increased use of ICOs as an alternative to equity, debt and fund issuances will also increase the likelihood of existing market players complaining to regulators that existing rules are not being enforced in a consistent way simply on the basis of the distribution channel; thus increasing pressure on regulators to act. A series of poorly executed ICOs could also increase the chance of class action lawsuits, particularly in the US, against issuing companies for misrepresentation of the rights or objectives of the ICO.

In such a state of significant market instability, uncertain regulatory perceptions and potential for legal action, what can be done to (i) ensure the cryptocurrency community can establish a sustainable and stable market, and (ii) ensure issuers can protect themselves and their investors, while still be able to experiment and refine optimal financing models? We now look at this from two sides: first from a legal/regulatory perspective and secondly based on best practices related to communications.

Legal and Regulatory Aspects

In the laundry example provided in Part 1, ultimately if we issued the LTX for our laundry project we may be raising risk capital. Why? Because the economic reality of this is that people are giving us money now to execute a project where they will gain some benefit in the future, and this benefit goes beyond a simple one off product or service. Unlike reward-based crowdfunding, such as a Kickstarter campaign, the upside for an ICO participant is not limited to receiving a single product or service. An ICO participant is essentially buying into the ongoing commercial viability and success of the issuing company, and participants anticipate that the value of the token(s) they own will increase, in which case they can either earn a greater financial return by selling the tokens (capital gains), receive a return such as profit share, dividend or interest payment (as in a traditional security), or gain access to more services at some discount (commercial benefits). In any event an ICO participant's expected returns may be seen as linked directly to the pooled funds of the ICO and efforts of the issuer to use those funds in executing its proposed plans to generate a return. It is this expectation that drives participants to not only pay for a one-off product or service (as they may on Kickstarter) but to buy into an ongoing commercial proposition, all in expectation of some form of direct or indirect financial gain.

A Security by Any Other Name...

Due to such complex economic realities of ICOs and the resulting tokens, it seems like the issued tokens may be a new form of asset class. It becomes increasingly difficult to distinguish a token with these rights from analogous existing structures which are long established forms of securities such as debt, shares or funds. If analysed correctly, how can a token issued with attendant voting rights, rights to a dividend and potentially involvement in management decisions be any different from an equity security? What distinguishes a company issuing tokens to raise funds to invest in a portfolio of underlying companies based on an investment thesis with the promise of capital or income returns from a conventional fund other than the sale of tokens to raise the funding?

Clearly one can structure an ICO so that its characteristics place the tokens outside of what constitutes a security. It is already clear from the public statements or commentary from many regulators that cryptocurrencies will likely be regulated as commodities or other fiat currencies and will not be treated as securities. This is likely to also be the case where the token gives rights to a one off service or product. It is not necessarily problematic that the tokens issued on an ICO are treated as securities and, with the right approach to structuring, may benefit from sufficient exemptions to minimise the impact of securities regulation. Given the ubiquity of the tokens and ease of trading, issuers seeking to be compliant will need to accept a degree of limitation on the scope of their offering and potentially in relation to the secondary market for their tokens to be issued and traded while meeting the requirements of existing securities legislation.

In the remainder of this section, we will explore some of the topics issuers will need to consider to effect a compliant ICO, which we will expand in more detail in a subsequent paper.

Structuring an ICO

As the market matures, issuing companies will want to ask themselves upfront how an ICO can be structured to meet the existing regulatory requirements, future proof the tokens to the extent possible and limit the liability of the issuer of the tokens.

It will make increasing sense for issuing companies to be clear on the "home" market in which they intend to base their issuing company. Picking a jurisdiction that is well disposed towards the development of blockchain technologies and ICOs is helpful, obviously for the benefits that brings, but also to allow the issuing company to make clear where it is not based from a regulatory perspective. Issuers will need to consider upcoming legislation and try and structure for this, which may involve a longer period liaising with regulators in a proactive way to mitigate the chances of an ICO becoming unlawful or needing a radical restructure after issue.

Choosing a limited liability vehicle as the token issuer will be important to ringfence the liability of the promoter of the issuer. Given the nascent market for ICOs, the process of selecting and identifying the relevant service providers such as payment agents, banks and exchanges/custodians should not be underestimated as part of this process.

Similarly, issuers will want to consider the terms and conditions of the tokens themselves. Simply issuing the tokens without reference to a detailed set of terms is a recipe for future disputes and litigation. One of the advantages of the token structure is the flexibility it brings compared with the traditional constraints of share capital and share issuance, leaving issuing companies with a high degree of choice in setting the terms and parameters of the tokens. This will need to be set against investors' appetite to invest in a token which gives too much control or discretion to the issuing company but in the right environment issuing companies may be able to use this flexibility to their advantage to raise funds with less constraints than would the case in a traditional financing.

Marketing an ICO

Allied to the discussion on structuring, if an ICO is likely to be classified as a securities offering, the issuing company will want to give careful consideration as to how it markets the tokens. Three key questions will be who is undertaking the marketing, where is the marketing being undertaken and who is the target of the marketing.

If the issuing company is formed specifically to be the issuer of the tokens, it is likely that entity will not be regulated to offer securities. Depending on the location of the issuer, consideration will have to be given as to right entity to use and whether it needs its own permission(s) to offer tokens or must work with a third party to do so.

The entity undertaking the marketing will have primary responsibility for the materials issued to support the token offering. In the traditional securities space, and the reader can see how this could be relevant to ICOs, offering materials are prepared as a tool to properly inform potential investors about the potential investment and the risks associated with it. It is a highly regulated area of law combined with an extensive body of market practice and expected norms that carries potential liability for both the issuer of the securities and for those that arrange the offering of those securities. Many token issuers currently do not work with financial advisers in the way it would be customary to do so (or indeed, required) on an equity or debt issuance. All of the liability for getting these materials right will rest with the issuing company.

In small or exempt offers, it may be possible to undertake an ICO on the basis of an information memorandum only where the contents are at the discretion of the issuer. These materials will be subject to the position at law in the relevant jurisdiction. For example, most legal systems have a concept of liability for misrepresentation and so if the materials are deliberately misleading or, indeed, in some cases just wrong, the issuing company and its officers may be liable to token holders for any misstatement or misrepresentation. even if a financial adviser is involved, they will normally require the directors or managers of the issuer to stand behind the statements the company makes.

If the offer is made on a broader basis and to an unrestricted number of people and the tokens are considered to be securities, it is likely that the offering documentation will be subject to more stringent requirements. For example, in the EU, issuers making an offer of fully transferable tokens that are treated as securities to more than 150 persons who are not qualified investors would be

required to produce a prospectus under the Prospectus Directive (unless the overall funds raised were small in size or another exemption applied). This would add considerably to the cost, timing and issuer liability in relation to an ICO. Many smaller issuers will want to structure their offering and marketing to fall outside of this requirement, although this may change over time as issuance increases.

The requirement to produce a prospectus increases the liability risk in that issuers will need to disclose more about their historic activities and future plans. This means issuers will need to follow existing market practice of verifying statements in their prospectus even more carefully to minimise the risk of a mistake in the first place, but also to be able to demonstrate due care and diligence was taken in putting together the prospectus. Similarly in the US, if exemptions do not apply, an issuer may be required to file with the SEC to issue tokens or face significant sanctions for breach of US securities laws.

For these reasons it will be important to ascertain where the marketing is being undertaken. But it will also be important to know who is the target of the marketing. That is partly due to the requirements of securities legislation such as the Prospectus Directive described above, but many jurisdictions also have stringent regimes on the distribution and marketing of securities, which could also apply to tokens. These are often known as financial promotion regimes. For example, a communication in or into the UK in relation to investment activity is prohibited unless it is approved by an authorised person (commonly a bank). Investment activity includes dealing in securities and contractually based investments, which is likely to catch a token with the expectation of a possible future economic return. Making such a communication without approval is a criminal offence. Issuers will therefore want to think hard about how to market their ICO in the UK (and similarly in other countries with similar regimes) to minimise the risk of non-compliance. This can be achieved by marketing the ICO to only certain types of investor, but issuing companies will need to accept as a result that the ICO is marketed to a narrow investor base than has been the case for some issuances which have occurred to date.

Other Liability Issues

While the debate in relation to whether tokens fall within the scope of existing securities legislation is an important one for issuers to grapple with, there are a number of other key areas for issuing companies to think about as well.

One of the key aspects is getting the Terms and Conditions of investing in an ICO right in order to give investors certainty, but also where needed to give an issuing company flexibility in a developing legal and regulatory environment. Many ICOs to date have given broad discretion to the issuing companies to amend or even cancel tokens based on potential regulatory clampdowns. That is a convenient mechanism for issuing companies, but does not seem likely to be a term that will survive as the ICO market matures. Instead, issuers may need to become clearer as to what happens in certain scenarios rather than reserving the discretion to act as the issuing company sees fit.

Inevitably and regrettably, the best laid plans of some issuing companies will not work out and there will be an insolvency. In that scenario, will token holders rank with general creditors and ahead of shareholders, or will liquidators treat them like quasi-equity holders and prefer other creditors of the issuing company first? It is not something that has so far been tested but we can expect that to change in the coming years.

issuing companies are also going to have to deal with challenges to the forum in which any dispute in relation to their tokens are determined. Some ICOs are not clearly documented in terms of where the tokens are issued and where are disputes should be resolved. The best drafted ones cover this and we would expect the market to move in this direction, but issuing companies will not be able to prevent challenges from token holders in jurisdictions not of their choosing. That is particularly likely to be the case where tokens are cancelled or returns/benefits not delivered, even if permitted on the face of the terms of the tokens, and where the token holder is not a sophisticated investor and a court wishes to take an interventionist stance.

Amongst other issues, companies are also going to have to consider matters such as tax reporting, KYC and anti-money laundering regulation, which are beyond the scope of this note but will have an inhibiting impact on the freedom to trade tokens compared with the experience to date with many issuance.

Communication and Beyond

As difficult as it may be, let us momentarily put the legal complexities to one side, as vague and jurisdictionally complicated Damoclean swords that they are. Instead, let's approach the concept of ICOs as mostly a communications issue. Assuming that commonly understood norms of ethical practice are maintained, here we will highlight key communication aspects to keep in mind.

Single Source of Communication

ICOs may be distributed, but communications shouldn't be. The best way to enlarge your risk profile to unimaginable levels is to allow multiple people on the team to talk about the ICO. Even if you're working from the same set of FAQs, investing often relies on the exact meanings of words. Electing one communicator on the team who is familiar with how investors and regulators think will help ensure some level of message control.

Reputation Matters

Many companies in the ICO space have a "Dumbo's Magic Feather" notion of public relations—that quick, favorable media hits will assure success. However, so much of finance depends on the reputations of those involved, and earning a reputation takes time and effort, while losing it takes very little. Whether within traditional or blockchain world, the team and sponsors of an ICO must have credible, verifiable bona fides in business or technology; and they should care about their reputation more than the immediate financial gains. Hard earned reputations should not be taken lightly, so associating with a project should mean you can vouch for the integrity of the rest of the team and their capability and commitment to deliver the marketed results.

Utility not Speculation

One of the most subtle and challenging aspects of communicating an ICO is to distance it from the payday - especially in a market brimming with mass delusions of getting rich quick! While assessing and communicating the commercial benefits of a token are fundamental, such information needs to be focused on the benefits for holders in relation to the utility offered through increased access to a product or service, rather than speculatory financial benefits from holding a scarce token that can be sold for a profit when the price rises! However, for “utility” of a token to be believable the product it gives access to, and the underlying product market fit, needs to be well defined and even proven. This is one of the reasons why token offerings for seed stage companies may turn out to make little or no sense beyond an instrument of speculation.

An extreme example of skewing utility and speculatory value through nothing but marketing comes from the “Great Beanie Baby Bubble” of the late 90s [35], when rare versions of the plush toys, created by the Ty Warner company, started selling for up to $5,000, simply due to phenomenal marketing based around their manufactured scarcity! However, by mid 1999 announcements of retiring product lines ceased to have price rise affects the Beanie Baby market was accustomed to. As a result the “short term market makers” started exiting in anticipation of a potential decline, thus resulting in an all out collapse! Those holding for the long term and the late adopters were left holding “lemons”. In one

extreme case an “investor”, saving for his children’s college tuitions, ended up losing up to $100,000 when the bubble burst [42]

Figure 7 : Which Beanie Baby Are You?
http://www.playbuzz.com/mtveditorial10/which-beanie-baby-are-you-quiz

Many people like to use tulip mania [36] to put current ICO market in context, but maybe the Beanie Baby mania is a more appropriate mirror. Beanie Babies and ICOs/tokens have potential “utility” for a small number of people, both have imposed artificial scarcity and are implicitly marketed as instruments of speculation in a market driven by asymmetric information. However, the key difference between the two is that Beanie Babies are clearly not securities, not unless Ty Warner was pooling funds from investors with the expectation of delivering beanie babies that would go up in value from their initial “investment” price.

With this in mind a fitting quote to end this three part work comes from an article on Slate: Beanie Babies: Bubble Economics and Psychology of a Plush Toy Investment [37]:

“From this distance, it’s easy to laugh at Beanie Baby fever, to mock it as just another pointless fad in a chintzy, hollow decade. But in the latter part of the 1990s, Beanie Babies were so much more than a fad: They were a mania, an obsession that ensnared not just gullible children but also otherwise responsible adults who lost all sense of perspective over these plush playthings. People sold—and bought—some rare Beanie Babies for $5,000 each and expected others to skyrocket in value within a decade. (Collectors were careful to keep each toy’s tag attached and protected by a plastic case; a Beanie Baby’s worth was said to fall by 50 percent once the tag was removed.) Looking back, it’s clear that the Beanie Baby craze was an economic bubble, fueled by frenzied speculation and blatantly baseless optimism. Bubbles are quite common, but bubbles over toys are not. Why did America lose its mind over stuffed animals?”

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