Initial Coin Offerings Hyped and Dehyped: An Empirical Examination*

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March 15, 2019

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Abstract

We conduct a systematic examination of the returns to initial coin offerings (ICOs) throughout the hype cycle using hand-compiled data on all trading ICOs from 2014 to 2019. We demonstrate that ICOs persistently outperform non-ICO cryptocurrencies during both the market boom and crash. We then uncover significant return determinants in the cross section along both informational and behavioral dimensions, and document significant differences in their return association in the post-hype period from late 2018 onward. Our results position ICOs as a unique asset class with features from both reward-based crowdfunding and equities, and the crowdfunding features become more dominant post-hype.

The last few years witnessed a surge in interest in cryptocurrencies and the blockchain technology, perhaps fueled by the meteoric rise—then the equally dramatic crash—of high-profile currencies such as Bitcoin, Ethereum, and XRP. Amid this backdrop, an emerging trend is a rapid shift in the role that of many cryptocurrencies play: from an alternative medium of exchange to fiat currencies to a substitute source of financing for entrepreneurs and small startups. Building on recent advances in the blockchain technology, an entrepreneur developing a new product or service can now issue—on a public, programmable blockchain such as Ethereum—"utility tokens" that confer access rights to the product instead of corporate control rights, and sell these tokens to the public in an Initial Coin Offering (ICO) campaign. This practice has gained significant popularity. Between 2014 and 2019, we track 2,198 ICOs with an reported $19.69 billion in capital raised.[1] In Figure 1, we plot the total funding and number of issuers by year, and compare them with Form-C regulation crowdfunding.[2] While the total funds raised in ICOs is still trivial relative to the volume of initial public stock offerings (IPOs), reported as $196 billion in 2017 alone,[3] the market served by ICOs is vastly different than that served by IPOs. ICO issuers are typically smaller and younger than IPO firms. As such, ICO issuers are more likely to be firms that might otherwise seek funding from angel investors, venture capitalists, or crowdsourcing. In fact, while ICO volumes are increasing, both reward-based[4] and equity crowdfunding activities are declining, as illustrated by Figure 1.

The ICO market came to a sudden halt in the latter half of 2018. With the aggregate cryptocurrency market falling by over 85% from its peak within a few months and regulatory pressure ramping up from both US and abroad,[5] funding has decreased by over 90%, with only 51 ICOs in our database successfully starting trading between July 2018 and February 2019. The dramatic boom and bust of the ICO cycle has kindled an intense debate among academics, practitioners, and regulators, on whether these tokens are equities or represent an entirely new asset class, how to value them, and whether they

[1] Because there is no disclosure regulation, funds raised in an ICO are usually self-reported by the issuers and vary significantly by source. Our funding estimate is on the conservative end. Some sources, such as coinschedule.com, report over $28 billion raised during the same period.

[2] Title III of the Jumpstart Our Business Startups (JOBS) Act of 2012 provides a registration exemption for certain crowdfunding campaigns. Details can be found at https://www.sec.gov/info/smallbus/secg/rccomplianceguide-051316.htm

[3] "Global number of IPOs highest since financial crisis," *Financial Times*, December 12, 2017.

[4] For example, both total funds raised and the number of projects on Kickstarter, the most popular reward-based crowdfunding platform, have fallen significantly during period of ICO popularity. Total funds raised/listed projects decreased from over $609 million/77,000 in 2015 to $564 million/44,000 in 2018. Details are available at http://icopartners.com/category/crowdfunding/.

[5] In Section 2 below, we compute a value-weighted index of all cryptocurrencies listed on coinmarketcap.com. The index return in 2018 is -85.18%.

are here to stay.

[Insert Figure 1 about here.]

In this paper, we conduct one of the first studies of initial pricing and subsequent performance of ICOs as a potentially unique and novel entrepreneurial financing mechanism. Our results support the ICO being a new, hybrid asset class with features from both reward-based crowdfunding such as Kickstarter (utility tokens represent access rights to a product or service) and public equities (tokens distributed in an ICO are freely tradeable on public cryptocurrency exchanges, thus giving participants immediate liquidity). Beside media hype and irrational exuberance, the popularity of ICOs could also be attributed to their hybrid appeal to both investors and consumers: participants in an ICO could be driven by either preferences for the underlying product as consumers (or resellers), by beliefs about the issuer's future cash flow prospects as investors, or a combination of both. Valuation of an ICO, therefore, might be significantly more nuanced than either IPO or crowdfunding in isolation.

This paper, as a fact-finding mission, therefore provides empirical evidence on the valuation of ICOs in relation to theories in both IPO and reward-based crowdfunding, and compare the relative prominence of each group of mechanisms over the entire hype cycle. We compile data on 2,198 ICOs from seven different reporting sources and link them to daily cryptocurrency trading records on *coinmarketcap.com* from June 2014 to March 2019, the specifics of which we discuss in Section 2. The resulting dataset of 584 trading ICOs that concluded between June 2014 to June 2018 allows us to systematically examine the short- (first-day) and medium-term (up to 180 days) performance of ICOs that go to market, and to identify key characteristics that appear to be correlated with post-ICO returns. In addition, we construct a "de-hyped" sample of 51 ICOs finished between July 2018 and February 2019. The recent crash of the cryptocurrency market offers an unique opportunity to isolate the key drivers of ICO returns: because utility tokens are usually viewed by unsophisticated investors as equivalent to other cryptocurrencies, the exit of these traders may reduce the noise in the valuation process of utility tokens. New ICOs issued during this period might have a significantly higher fraction of more "rational" consumer-investor participants with more interest in the actual utility of the underlying product. Therefore, factors that remain significantly related to ICO returns during this post-hype period may be more likely to persist in the more mature market going forward.

We find several new results. First, as we document in Section 3.1, in the aggregate, the majority of

returns in the cryptocurrency asset class can in fact be attributed to ICOs, as they significantly outperform other non-ICO cryptocurrencies in both event time and calendar time. The median (mean) market-adjusted first-day return of ICOs, for example, is 12.09% (179.76%), compared to -0.21% (48.65%) for non-ICO coins. The performance wedge extends to the first 180 days, and persists both in the restricted sample of high-liquidity ICOs and in the de-hyped period of July 2018 onward. Nevertheless, returns exhibit a significant amount of skewness, and averages are often subject to the influence of select coins' outsize returns. Median cumulative returns, by contrast, drift downward from day one onward for both ICOs and non-ICO coins, and become negative after the first 30 days. Despite this, the overall distribution of ICO returns lies significantly to the right of non-ICO returns, suggesting that market participants treat the potential consumer utility conveyed by the product-linked utility tokens—a hallmark of an ICO—as a significant differentiator of cryptocurrencies and tokens, and view them more favorably than pure cryptocurrencies or "altcoins" serving only as a medium of exchange.

We then examine the substantial heterogeneities in returns across ICOs. Despite the overall downward trend in returns, some ICOs perform remarkably well even in the long term and even after the cryptocurrency market crash. While there is no theory specifically proposing features related to the cross-section of ICO returns, we use the large IPO literature, as well as the recent literature on reward-based crowdfunding, to guide our empirical analysis. Just as IPO returns can differ by the level of (1) information asymmetry and (2) investor sentiment in the issuing process, ICO returns might be similarly related to both an "informational" dimension along which information about the quality of the ICO differs, and a "behavioral" dimension along which investor attention and sentiment vary. Similarly, the literature on crowdfunding posits several important design features that convey the most informational value on product quality. We first measure a series of metrics related to campaign design in the data, and document in Section 3.2 that both short and medium-term ICO returns are negatively related to campaign length, pricing discount (e.g. bonuses), and the existence of pre-sale campaigns. Returns are positively related to the closeness between the minimum and maximum funding goals. Moreover, consistent with theoretical predictions by Catalini and Gans (2018), we do not find a significant relation between total token supply and returns.

Our next group of tests examine the the relation between ICO returns and product quality, captured by activities and progress that are already complete before the ICO campaign. In contrast to reward-based crowdfunding platforms such as Kickstarter, most of the ICO products are software in nature and

many are open-sourced on web portals such as GitHub. Therefore, their quality could be more readily approximated by detailed code contribution and update histories, which we compile from GitHub. We document significantly higher returns for ICO projects with more frequent updates and codes contributed by more experienced accounts, which suggests that market participants are likely attentive to the progress of the proposed projects prior to and during the ICO process, and prefer projects with more tangible activities.

Furthermore, in Section 3.2, we examine the relation between returns and seven behavioral characteristics of the ICO that have been uncovered in the empirical IPO literature but seem difficult to rationalize. First, in contrast to a U-shaped relation between return and IPO price documented by Fernando, Krishnamurthy, and Spindt (2004), we find a monotonically decreasing relation between ICO prices and returns in the short term and a muted U-shaped relation in the longer term. We then analyze the sentiment and uncertainty in the language of both ICO whitepapers (analogous to an IPO prospectus) and investor discussions on the main ICO-related Internet forum. In contrast to the IPO literature such as Jegadeesh and Wu (2013) and Loughran and McDonald (2013), we do not observe a statistically significant relation between these sentiment indicators and ICO returns.

Finally, we examine the above relations using the de-hyped sample of recent ICOs and uncover significant differences between periods with high and low market hype. First, market participants seem to be less subject to behavioral biases in the post-hype period: price levels are no longer significantly associated with ICO returns. At the same time, consistent with the crowndunfing literature, participants are significantly more attentive to the design of the campaign and signals of product quality: campaigns with unrealistic funding goals, high dilutive potential, low entry thresholds, and are not accessible to US investors are penalized significantly more than during the period with high market hype. The relation between quality indicators such as pre-campaign GitHub activities and ICO returns also becomes more pronounced. Moreover, more attention is paid to the content of disclosures: project whitepapers with less hype and more cautious, risk-related discussions are associated with higher ICO returns. These evidences could indicate a shift in the type of participants in an ICO: the quality of the existing product and its risks—its direct consumer utility rather than mere hype or perceived cash flow growth potential—is increasingly becoming the predominant determinant of ICO returns in the post-hype period. Future valuations of ICOs, therefore, might be more in line with models for reward-based crowdfunding campaigns than with models for equities.

Relation to Existing Literature

Our paper is related to a contemporaneous theoretical and empirical literature on cryptocurrency offerings. Studies such as Canidio (2018), Catalini and Gans (2018), Chod and Lyandres (2018), Cong, Li, and Wang (2018a), Li and Mann (2018), and Sockin and Xiong (2018) have examined theoretical issues in different aspects of the offering process. The focus of these papers is generally in terms of mechanism design, in order to understand why ICOs have emerged as an alternative source of capital. In addition, a number of empirical papers, such as Adhami, Giudici, and Martinazzi (2018), Amsden and Schweizer (2018), Lee, Li, and Shin (2018), and Howell, Niessner, and Yermack (2018), have focused on various measures of the success (or failure) of ICOs such as the total amount of fund raised and whether the funding caps are met. By contrast, our study focuses on ex-post ICO returns *after* they successfully start trading. We view ICOs as a separate asset class that is a hybrid between reward-based crowdfunding and equities, and examine important factors related to the initial and subsequent pricing of this asset class.

Our study is most closely related to recent papers on the returns to coin offerings, such as Benedetti and Kostovetsky (2018), Momtaz (2018a), and Momtaz (2018b). Benedetti and Kostovetsky (2018) empirically investigate the behavior of ICOs at issue and over 60 days, and relate the performance to Twitter followers and intensity. Hu, Parlour, and Rajan (2018) also provide some analysis of a subsample of ICOs, focusing on the moments and covariance structure of cryptocurrencies, and on presenting stylized facts. Although we utilize similar data, we come to different conclusions on ICO performance, including significantly less underpricing in cryptocurrency terms. In addition, we identify and examine a variety of cross-sectional determinants of ICO performance in both event time and calendar time, classified along the informational and behavioral dimensions commonly documented in the IPO literature.

Broadly, the literature on coin offerings lies at the intersection of two branches of the finance literature, the literature on raising capital and on cryptocurrencies. Current theoretical work focus on how the currencies should be priced (Athey, Parashkevov, Sarukkai, and Xia 2016, Pagnotta and Buraschi 2018, Sockin and Xiong 2018), and microstructure of cryptocurrency markets (Easley, O'Hara, and Basu 2017, Cong, He, and Li 2018b). Empirical studies focus largely on asset pricing implications of the securities. For example, Makarov and Schoar (2018) examine apparent arbitrage opportunities in cryptocurrency markets. Hu et al. (2018) examine common variation in coins and document a number of stylized facts. Bianchi (2018) considers whether cryptocurrency can be viewed as a separate asset class. Griffin and

Shams (2018) examine commonalities in trading of Tether and Bitcoin. While our work relates to these papers, we depart in studying empirical differences in the value of cryptocurrencies at issue and the use of coins as a funding mechanism.

Finally, our study also contributes to the inter-disciplinary literature on reward-based crowdfunding and entrepreneurial finance. Building upon existing theories on the interplay between equity- and reward-based crowdfunding (Cholakova and Clarysse, 2015), our results document the effect of injecting equity-like features into traditional reward-based online crowdfunding such as Kickstarter (Mollick, 2014), and quantify the impact of campaign design and operations (Zhang, Savin, and Veeraraghavan, 2017). Overall, our results document the nuances of market participants' preferences for the hybrid equity–crowdfunding features of ICOs, and motivate more theoretical research on ICOs as a unique capital raising mechanism in the pecking order.

1 Background on the Market for and Design of ICOs

ICOs represent a new form of capital raising that builds on the recent popularity of cryptocurrencies and advances in the blockchain technology, particularly "general-purpose" blockchains (such as Ethereum) that support the execution of user-generated program scripts (often labeled as "smart contracts", which is in contrast to the Bitcoin blockchain which has limited programmability). At the most basic level, however, an ICO is simply a hybrid crowdfunding campaign incorporating features from both reward-based crowdfunding (e.g. Kickstarter) and public equity financing (e.g. IPO).

Suppose an entrepreneur without access to public equity and debt markets has a positive-NPV project requiring external capital to develop. As an example, suppose the project consists of a subscription-based online service.[6] Instead of using private equity or venture capital financing, which could be costly and usually necessitate significant monitoring from investors, the entrepreneur could issue a batch of "utility tokens" coded as a smart contract on a blockchain, and program these tokens as a prerequisite to utilizing the product.[7] In essence, these tokens confer access rights to the product. In the subscription example, this means that service subscribers could use the utility tokens that they acquire (from either primary or secondary markets) to pay for their subscriptions, often at a discount compared to fiat payments.[8] The

[6] A real-world example of this type of service is FileCoin, a "blockchain-based file storage network". More information can be found at https://filecoin.io/

[7] In practice, the majority of utility tokens (>90%) are issued on the Ethereum blockchain, with a small minority utilizing competing platforms such as Qtum and Tezos.

[8] Many ICO issuers, such as FileCoin, disallow fiat payments altogether and only accept utility token payments for their products/services.

entrepreneur (hereafter referred to as the "issuer" to be consistent with the IPO literature) then offers these tokens for sale to the public at a pre-specified price, the specifics of which we detail in the next subsection. Overall, the mechanism so far closely resembles a reward-based crowdfunding campaign such as those on *Kickstarter.com*, where entrepreneurs publicly "pre-sell" their products/services to early customers on the platform (Mollick 2014). Therefore, future users of the product or service, as well as resellers and distributors, might constitute a significant proportion of ICO participants.

The next stage of the ICO, however, departs significantly from the typical reward-based crowdfunding format. Unlike a Kickstarter campaign where the pre-sold products and access rights are non-transferable, utility tokens distributed via an ICO are freely tradeable on any of the hundreds of public cryptocurrency exchanges, thus giving investors almost immediate liquidity with short, if any, lock-up periods.[9] This setting is similar to the equity market where non-insider IPO investors are typically allowed to sell their shares on public stock exchanges after the IPO.

Therefore, in contrast to both IPO and reward-based crowdfunding, participants in in an ICO could be motivated by either (1) preferences for the issuer's product/service as consumers, or (2) beliefs about the issuer's future cash flow prospects as investors, or a combination of both. The latter belief arises because as demand for the issuer's product increases, access rights to the product would become more valuable. Values of tokens offering these access rights would serve as a proxy for future consumer demand and cash flows. Therefore, ICO tokens share some equity features despite not being labeled as such and not conferring any corporate control rights.[10] This unique, hybrid appeal to both consumers and investors potentially makes ICOs a novel capital raising mechanism. However, it is not clear which of the two forces is dominant, and our empirical results in Section 3.1 and Section 4 shed specific light on this issue in different time periods.

[9] In reality, many large cryptocurrency exchanges have at least some listing requirements. Therefore, not all tokens begin trading immediately after ICO ends. In our data, the majority of ICOs (71.8%) begin trading on Coinmarketcap-tracked exchanges within 30 days of their ICOs, and a small fraction (12.3%) begin trading more than 60 days after the end of their campaigns.

[10] Note that equity ICO tokens that offer direct claims to residual cash flows and/or control rights, such as the Decentralized Autonomous Organization (DAO), have been effectively banned after the SEC's 2017 ruling. More information can be found at https://www.sec.gov/news/press-release/2017-131. Most other countries have also banned equity ICO issuance. As of 2019, the vast majority of ICOs issue utility tokens. A small fraction of ICOs, such as the "GBC Gold Coin" (https://coinmarketcap.com/currencies/gbcgoldcoin/) do not seem to have any concrete product backing. Other ICOs, such as CryptoKami (https://cryptokami.io/), are outright scams. For the current scope of the paper, we do not parse deeper into the descriptions to distinguish the legitimacy of ICO products.

1.1 Details of the ICO Token Issuance Process

This section describes the typical features of ICOs and compares them with those of IPOs. Perhaps not surprisingly, the most significant difference is the lack of regulation and disclosure requirements for ICOs. All issuers in the United States, for example, are required to register their intention of an IPO with the SEC, describe their business, the risks that they face, and their financial situations with significant detail in Form S-1 (the IPO prospectus), and follow up with more disclosures in roadshows and other marketing activities. Most ICOs, by contrast, are announced in Internet message boards such as Bitcointalk.[11] A project "whitepaper" usually takes the place of the prospectus and offers a high-level description of the project and the development "roadmap", but has significantly less detail on the business operations and little, of any, financial and risk disclosure.[12] Subsequent marketing is often done by promoting Bitcointalk posts, paid online marketing campaigns (e.g. token "bounties" earned by promoting the project via social media), and other retail-oriented channels such as celebrity endorsements, most of which do not offer more concrete disclosures. Consequently, compared to IPOs, ICOs usually have significantly higher information asymmetry on all operational and financial aspects. The overall level of disclosure is similar to reward-based crowdfunding campaigns.

Second, once announced, most ICOs do not involve underwriters or syndicates. While the issuer might employ the help of outside marketing agencies, most underwriting-related decisions, including crucially the ICO price, are made by the issuer itself without consulting with potential investors. Similar to a crowdfunding campaign, the issuer would also set funding goals, including a "soft cap" above which the ICO would proceed and funds would be retained, and a "hard cap" denoting the maximum amount of funding sought.[13] Investors in this stage are price takers and usually do not have bargaining power over token prices.

Third, in contrast to both IPOs and reward-based crowdfunding, an ICO could have more than one price. This is because issuers could offer various discounts to early participants in the campaign. For example, many issuers use a tiered "bonus" structure to award proportionally more tokens to partici-

[11] The majority of ICOs are announced on the Bitcointalk forum, available at https://bitcointalk.org/index.php?board=159.0. These posts are marked with the tag "[ANN]". Some ICOs are also announced on Reddit in various crypto-themed "subreddits".

[12] The average and median whitepaper length in our sample is 9,159 and 5,542 words, respectively. An average prospectus, by contrast, contains more than 85,000 words.

[13] Although hard caps are supposedly binding, some issuers do continue to accept funds after their hard caps are reached. We use the ratio of total funds raised to hard cap as an important signal of issuer quality in our return analysis.

pants in earlier time intervals. Some issuers even create "pre-ICO" sale events where tokens are offered to private (and some public) investors at even steeper discounts. These practices make computing the ICO return nontrivial. In our analysis, we always use the highest, "public sale" price as the main ICO price, and use the bonus structure and pre-ICO campaigns as an important signal of quality.

Fourth, instead of going through a formal settlement process, most ICO tokens are distributed, and funds collected, using cryptocurrencies such as Ethereum (most common) and Bitcoin as payments. Token buyers, for example, would transfer the requisite amount of Ethers to the published wallet address of the issuer, and the corresponding tokens would be distributed to the addresses that the buyer specifies and recorded on the Ethereum blockchain. In this setting, default is unlikely given the unique blockchain data structure, which effectively verifies the sufficiency of funds before each transaction is validated.[14] At the same time, however, because of the cryptographic nature of blockchain transactions, many ICO token sales are "pseudonymous" in nature, and Know Your Customer (KYC) practices are not mandated.[15] As a result, many issuers (more than half of our sample) do not impose KYC requirements and choose not to learn the identities of their investors or verify their sources of funds other than the standard blockchain verification that the fund is sufficient. This potentially introduces a two-sided moral hazard problem in the spirit of Bhattacharyya and Lafontaine (1995), which we explore further in our empirical analysis.

Finally, it is worth noting that not all cryptocurrencies/tokens need an ICO to launch. In fact, about 70% of cryptocurrencies tracked by *coinmarketcap.com*, including Bitcoin, do not have reported ICO campaigns. These cryptocurrencies (or "altcoins") often emulate Bitcoin in concept and in operation, and are organically launched—supported by a network of validation nodes or "miners"—without a public sale process. The crucial difference between these coins and ICOs is that the latter are an access token to, and a financing means for, a specific product or service, while the former primarily serve as an alternative medium of exchange and are not backed by specific products. In this sense, the latter share more similarities with equities while the former are more similar to currencies.

[14] Interested readers can refer to Chapter 3.1 and 3.2 of Narayanan, Bonneau, Felten, Miller, and Goldfeder (2016) for more technical details of this validation process.

[15] The majority of ICOs use the Ethereum platform, where transactions are conducted between Ethereum wallet addresses, which are cryptographic hashes of users' anonymous, public keys. Privacy-conscious users tend to create a separate public key for each transaction. Therefore, holdings of these ICO coins are traceable only to these addresses but not the real identities behind them. This feature is termed "pseudonymity" in cryptography.

2 Data and Sample Construction

In contrast to IPOs, there is no centralized information repository such as SEC's EDGAR for ICOs. Instead, a myriad of private ratings websites track and rate these offerings, and both issuers and the public could report key information on an ICO to these web sites. Issuers could also update their Bitcointalk announcement posts with new information. As a result, ICO data are scattered across these sources, with data quality, coverage, and reliability varying significantly from source to source. In order to compile a comprehensive and reliable database of ICOs, it is therefore necessary to collect data across a wide variety of sources and reconcile between them.

We collect ICO data from seven sources that have top global web traffic ranks from Alexa.com. We develop a customized web scraping algorithm for each source and collect raw data for all ICOs with valid reported prices on these sites, from the beginning of their coverage to February 2019. Specifically, we collect information on 1,408 ICOs from *icobench.com*, 1,223 from *icorating.com*, 465 from *icocheck.com*, 378 from *icodrops.com*, 265 from *cryptoslate.com*, 361 from *icodata.io*, and 302 from *trackico.com*. We do not use ratings from these sites because of the significant subjectivity and variance of these ratings. Merging outputs from these sources and removing duplicates result in 2,198 unique ICO campaigns between July 2014 to February 2019.

Next, we link these offerings to daily trading data from *coinmarketcap.com*, which is the leading source of cryptocurrency price and volume information and is used by most studies in the literature. As of March 2019, it pulls data on over 2,000 cryptocurrencies with at least $10,000 in daily trading volume from over 200 leading exchanges (with some notable exceptions due to unavailability of data APIs) and aggregates them, by cryptocurrency, into a daily (UTC time) open-high-low-close dollar-denominated price format, together with the total dollar trading volume. We first collect price and volume data on all listed coins, both alive (trading) and dead (delisted/no trading volume reported), from June 2013 to March 10th, 2019. We then match these data to our ICO sample using both ticker symbols and token name strings. This step results in three distinct samples for our main study: (1) the main ICO sample of 584 tokens that concluded before June 2018, (2) the non-ICO sample of 1,471 tokens and coins on Coinmarketcap during the same period, and (3) the "de-hyped" sample of 51 ICOs finished between July 2018 and February 2019. We stop the sample collection in February 2019 to ensure at least 30 days of available price data on Coinmarketcap.

Note that out of the 2,198 ICOs that we collect data on, we focus on the subset of 635 ICOs with verified trading records due to two reasons. First, the focus of our study is not the success metrics of ICOs defined on fund raised and whether the funding caps are met, but the ex-post ICO returns after they successfully start trading. Second, it is difficult to ascertain the exact status of the remaining offerings in our ICO sample. The first possibility is that they are simply failed campaigns that are terminated before the planned end dates, which is credible as some of these ICOs do report raised amounts below the minimum, "soft cap" target. A second possibility is that while their campaigns are complete, trading have yet to begin on any cryptocurrency exchange. This is also plausible because some of them have verified transaction histories on the Ethereum blockchain with funds being transferred to the issuer's wallets, as Lee et al. (2018) also note. Yet another possibility is that they are in fact trading on some smaller exchanges that are not tracked by Coinmarketcap because of these exchanges do not provide data access APIs, and a manual examination reveals over 50 coins trading on exchanges such as *cryptopia.com* that do not provide data to Coinmarketcap. As such, we cannot definitively classify these ICOs as either ongoing, failed, or successful ones. We therefore focus on the Coinmarketcap-tracked ICOs and analyze their performance conditional on their successful launch. Our results should be interpreted with this focus in mind.

Then, for each offering in our ICO sample, we obtain a wide range of characteristics from both our scraping output and additional textual analysis on the content of the announcement, whitepaper, forum posts, and code repository activities. We present the summary statistics of these characteristics in Table 1. At the minimum, we require price data to be available for all ICOs. Most prices in our sample are quoted in fiat currencies such as dollars and euros, and some are in Ethereum and other cryptocurrencies such as Bitcoin, NEO, and Qtum. We first convert all prices to dollars based on the prices of quoted cryptocurrencies on the last day of the ICO campaign. We then use the highest price reported across all sources as the ICO price for our analysis.[16] Table 1 below illustrates that most ICOs have low unit prices, with the median at $0.17 and the 90th percentile at $1.55 per token. This suggests that issuers might have incentives to set low unit prices to attract unsophisticated retail participants. This seems to be particularly true in the post-hype period, as both the average ($0.85) and median ($0.07) prices are significantly lower.

[16] Our results are consistent if we use the average cryptocurrency prices during the entire ICO campaign for price conversion, and if we use the lowest and average reported prices across sources.

[Insert Table 1 about here.]

We then collect and tabulate statistics related to the fundraising campaigns. For total funds raised, soft cap, and hard cap levels, we first convert the amounts into dollars, if necessary, within each source and select the highest amount across sources. Our results indicate that issuers differ significantly in their ability to raise funds in an ICO. An average campaign in our sample raises $22.07 million (median $14.23 million, 10th and 90th-percentiles at $1.26 and $45.49 million, respectively), which is a smaller amount than IPOs but significantly more than reward-based crowdfunding campaigns. Despite this, ICOs typically have much higher funding goals, with median hard cap levels being 75% higher than funds raised, at $25 million (average: $3.55 billion, 90th-percentile: $100 million). In addition, most ICOs tend to have low bars allowing campaigns to proceed, as the median soft cap is only $4.47 million. Yet again, both goals are significantly more modest in the post-hype period, indicating that issuers during this period are likely to be even more early-stage, smaller entrepreneurs.

In addition, for many ICOs, only a fraction of the tokens are distributed to investors, and the rest are reserved as insider stakes or future supply. We compute the percent of tokens sold in the ICO as the number of tokens distributed in the campaign divided by the total token supply. On average, an ICO distributes about half of the total available tokens. We also compute the maximum bonus level as one minus the ratio between the implied price with the maximum amount of bonus applied and the ICO price. Most ICOs offer some bonuses to early participants, and the average discount is 31.25% and is relatively unchanged in the post-hype sample. This indicates that compared to public investors, early participants of the ICO would be able to realize significantly higher profits when tokens start to trade, thus incentivizing them to sell earlier.

We then expand our investigation beyond the third-party sources into actual project activity, business description, and social media activities. First, many ICO projects are software products (often utilizing blockchains) whose programming code is encouraged to be open-source. Therefore, the quality of the existing product could be visible, as issuers have the option to publish their code on popular online repositories such as *GitHub.com*. Using a scraping algorithm that we design specifically for GitHub, we search the announcement texts of the ICOs in our sample for references to GitHub postings obtain, if available, GitHub histories on (1) the number of times that the posted source code has been revamped (labeled as "code commits" by GitHub), (2) the number and the age (days since registered on GitHub)

of accounts updating the source code, and (3) the number and the age of code folders (labeled as "repositories"). We obtain GitHub information for 386 out of 635 ICOs *before* the end of the campaigns, and again observe a significant variance of coding activities across issuers, ranging from a low end (10th percentile) of 5 revisions to a high end of 402 revisions.

Finally, we analyze the sentiment and uncertainty from the languages of whitepapers and the languages of original ICO announcement posts and replies by verified accounts with at least 30 posts on the Bitcointalk forum. We follow a standard bag-of-words approach in this process and for each document, we first tabulate the total number of positive/negative words from the Loughran and McDonald (2011) dictionaries, we then compute the net sentiment score as the difference between positive and negative words divided by the total number of words. Similarly, we compute the uncertainty score as the ratio between the number of uncertain words and the total number of words. On average, ICO whitepapers tend to have a slightly negative tone (0.44% net negative words) while the forum posts have a slightly positive tone (0.50%). However, whitepapers became significantly more negative (1.98% net negative words) for IPOs in the post-hype sample, suggesting that issuers are likely using more cautious language in describing their products, and also including more discussion on potential risks. Moreover, both tone and uncertainty levels vary significantly between ICOs, with some issues having highly positive discussions in both whitepapers and on message boards, which could be an indication of either high investor enthusiasm or paid promotional activities. In summary, ICOs in our sample exhibit significant heterogeneities in a variety of informational and behavioral characteristics, which we carefully examine and relate to heterogeneities in post-ICO performances in the following section.

3 Empirical Tests and Results

In this section, we present our main empirical results from our main ICO sample in two major groups: aggregate performance of ICOs in the time series, and return heterogeneities and their determinants in the cross section. Within each group, we present evidence in both event time and calendar time.

3.1 Aggregate Performance of ICOs

3.1.1 Performance of ICOs and Other Cryptocurrencies in Event Time

We report summary statistics in event time for our ICO and Non-ICO samples in Table 2 and Figure 2 below. For the ICO sample, we compute the event window returns relative to the highest reported ICO

price. For the Non-ICO sample, returns are computed based on the opening price of the first trading day. We present both mean and median returns in windows ranging from one day to 180 days. Hu et al. (2018) note that the cryptocurrencies in their sample have secondary market returns that are strongly correlated with Bitcoin. As a result, cryptocurrencies in general were swept up in the surge of the price of Bitcoin in U.S. Dollar terms in 2017. We therefore present three series of returns: (1) the unadjusted return, $R_{i,t}$, (2) Bitcoin-adjusted return, $R_{i,t} - R_{BTC,t}$, and (3) "market-adjusted" return, $R_{i,t} - R_t^{VW}$, where the daily returns are adjusted with a value-weighted index of all Coinmarketcap-tracked cryptocurrencies, computed as:

$$R_t^{VW} = \sum_{i=1}^{n} \left(\frac{P_{i,t} S_{i,t}}{\sum_{k=1}^{n} P_{k,t} S_{k,t}} \right) R_{i,t}, \tag{1}$$

where $P_{i,t}$ denotes daily closing prices and $S_{i,t}$ denotes token supply in circulation. Using all three series ensures that returns to ICOs in our sample are not simply reflecting the rise in high-profile cryptocurrencies.

[Insert Table 2 and Figure 2 about here.]

As shown in the table, the average ICO has a significant first day return of 180.23% (179.76% market-adjusted), which on the surface suggests the feasibility of an extremely high return by investing in the average ICO, although in market-adjusted terms, the cumulative returns become lower after the first day. A substantial amount of skewness, however, is evident in the data. As a relatively new and illiquid asset class, cryptocurrencies often have sensational, extreme returns.[17] In sharp contrast to the mean returns, the median ICO has a first day performance of 15.47% (12.09% market-adjusted). More importantly, median cumulative returns drift downward from day one. Returns become negative if the ICO is held for more than 30 days, and the 180-day market-adjusted return drops to about -50%. Thus, the data suggest that while one might be fortunate in holding a portfolio of all of the ICOs in our sample (in event time), an IPO selected at random is likely to have a negative return in the medium term. Investors, therefore, might be incentivized to sell early instead of holding on to the tokens and eventually

[17] The largest one-day return in our ICO sample is EthBits (ETBS), which on September 7, 2017 realized a daily return of 53,191% with a volume of $8,101.

utilizing the associated product/service. This point is reinforced in the bottom panel of Figure 2, which depicts the median dollar trading volume of our ICO and non-ICO samples. The volume is significantly higher within the first 5 days of the ICO, then quickly deteriorates in the first 30 days.

More importantly, ICOs have significantly higher returns than other non-ICO coins and tokens, both in the short and medium terms. The median first-day return for non-ICO coins is essentially zero, compared to 15.47% for ICOs. At the 180-day mark, the median non-ICO coins would have lost 71.13% of their (market-adjusted) value while the ICOs lose 49.96%. This is further confirmed by the top panel of Figure 2, which shows that the entire distribution of ICOs seem to lie to the right of non-ICO coins. Trading volume for non-ICO coins also decline more precipitously than ICOs, and do not recover in the longer term. The significant performance wedge between ICOs and non-ICO coins suggests that market participants treat the existence of a product/service capable of generating cash flows—however early in development it might be—as a significant differentiator of cryptocurrencies and tokens, and view these tokens more favorably than pure cryptocurrencies that serve only as a medium of exchange.

Third, while the aggregate performance, particularly the median returns, are sobering for a typical ICO investor, there are significant heterogeneities in the returns and some ICOs do perform remarkably well, even in the long term, and even after the cryptocurrency market crash. As Figure 2 illustrates, at the 75th percentile of the distribution, the initial ICO return is close to ten times as large (140%), and remains significantly positive even at the 180-day mark. These results suggest the possible existence of cross-sectional drivers of post-ICO returns. We identify and examine characteristics that we hypothesize are related to short- and medium-run ICO performance in Section 3.2.

3.1.2 Aggregate ICO Performance in Calendar Time

While the previous subsection provides evidence on the event-time performance of ICOs and other cryptocurrencies in the relatively short window of up to 180 days, this section provides further corroborating evidence in a longer-term, calendar-time format, which presumably would also result in more tradeable portfolios. Specifically, for each week starting in January 1, 2017, we form value-weighted and equal-weighted portfolios of all coins that have finished an ICO campaign before that week. The portfolio weights are adjusted weekly to incorporate newly-issued ICOs during each previous week. We perform the same procedure for non-ICO coins in our sample, and in total obtain four calendar-time portfolios, two equal-weighted and two value-weighted. In Table 3 below, we report the return characteristics

and correlations of these portfolios, as well as the aforementioned market portfolios, returns to Bitcoin, Ethereum, and the CRSP value-weighted stock market index. To minimize the effect of outliers on the (particularly equal-weighted) portfolio returns, we also report the same statistics from the trimmed samples where we remove the top and bottom 1% of returns prior to constructing the calendar-time portfolios.

[Insert Table 3 and Figure 3 about here.]

First, the returns of cryptocurrencies, ICO or not, are highly correlated, with correlation coefficients among value-weighted portfolios as high as 80%. At the same time, both ICOs and non-ICO coins have low return correlation with the aggregate stock market. More importantly, again the ICOs have significantly outperform non-ICO coins in calendar time by up to 1.35% per week. This is true even if we restrict the sample to the "post-crash" period of January 2018 onward (Panel C of Figure 3), which is again consistent with market participants' strong preference for coins and tokens backed by products and services. Moreover, this performance wedge cannot be explained by liquidity premia alone: We construct a series of high-liquidity portfolios from the restricted sample where we require each coin to have a weekly trading volume of at least $10 million, or roughly the 90th percentile in average weekly volume. We then compare the return statistics of the full and high-liquidity portfolios in middle panel of Table 3 and find that the value-weighted ICO portfolio still outperforms the non-ICO portfolio. These results suggest that market participants probably assign similar levels of liquidity premia to all cryptocurrencies (both ICO and non-ICO) as a whole.

3.2 Performance of ICOs in the Cross-Section

The significant heterogeneities in both the magnitude and persistence across different ICO return quantiles indicate the existence of features correlating with ICO performance in the cross section. While there is no theory specifically proposing these features in an ICO setting, the large IPO literature provides some useful starting points for our empirical analysis. Specifically, just as IPO returns could differ by the level of (1) information asymmetry and (2) investor sentiment in the issuing process, ICO returns might be similarly driven both by a "signaling" dimension along which information about the *quality* of the ICO differs, and by a "behavioral" dimension along which investor attention and *sentiment* varies. In this section, we identify proxies of these dimensions in the data, and present evidence relating these dimensions to both short and medium-term ICO returns. This process also sheds light on the applicability

of existing IPO theories to ICOs, and presents new results that motivate further theoretical explorations in this novel fundraising scheme.

3.2.1 Event-Time Analysis

We first organize our data on 21 ICO features, described in detail in Section 2, into two types: *informational* or *quality characteristics* and *behavioral characteristics*. Recall that our sample ICOs exhibit significant heterogeneities in these characteristics. For each characteristic, we sort the ICO sample into either quintiles or terciles depending on the number of available observations. Then, for each quintile or tercile, we compute the average and median cumulative abnormal (market-adjusted) returns of all ICOs in the group. We present the results in event windows ranging from one day to 180 days, and report the differences and their statistical significance levels in Table 4 below.

[Insert Table 4 about here.]

Campaign Characteristics

First, a crucial signal for any crowdfunding campaign is its length, which in our ICO setting refers to the amount of time that an ICO takes to reach its fundraising goal. Intuitively, if the "wisdom of the crowd" holds, then an ICO backed by a higher-quality product would take less time to reach this goal than a lower quality ICO. Consequently, returns should be higher for shorter campaign lengths. In the short term, this is confirmed by the first panel of Table 4, which shows a monotonically decreasing relationship between campaign length and first-day ICO returns, with shorter campaigns having on average 46.95% higher first-day returns. Median returns for shorter ICOs are up to 17% higher on day 1 but the relationship is less monotonic.

A closely related quality signal is the total amount of fund raised, and how close they are to the stated funding target. We expect that campaigns that raise more funds are more likely to be high quality campaigns, and therefore lead to higher returns. In addition, the benefit of a hard cap to an investor is that the cap limits the dilution a coin holder might experience. When the ratio of the total amount raised to the hard cap is high, we hypothesize that the ICO is of higher quality and should therefore be expected to have a higher return. ICOs falling significantly below the hard cap may indicate issuer overvaluation of their projects. Similarly, because the funding caps are set entirely by the issuers, how they are set in the first place might be an important quality signal. Recall that a soft cap is a minimum amount to be raised in an ICO in order for it proceed. If the soft cap is hit, and funds are not returned to

investors, then the project will be partially implemented. Thus, a low ratio of soft cap to hard cap may suggest a willingness on the part of the issuer to proceed regardless of whether the project can be fully successful, and therefore represent a negative signal. An overly lofty hard cap target relative to the soft cap might again indicate managerial overconfidence and/or plain greediness. Overall, the results in the next three panels of Table 4 demonstrate a significant, but non-monotonic, relation between returns and these ratios. ICOs raising funds close to the hard cap levels indeed have significant higher market-adjusted returns in the first 90 days, but those with a low ratio of soft cap to hard cap have significantly lower short-term returns. While the non-monotonicity might be partially explained by some issuers (about 5% in our sample) continue to accept funds after hard caps are reached, which should be a negative signal indicating substantially higher probability of future dilution, this calls for caution in interpreting our results in these panels.

Next, the token distribution and supply information potentially serve as a unique quality signal for ICOs. Recall that not all tokens in an ICO are distributed to investors. Usually, some tokens are reserved as either future supply or as issuers' stake. The ratio of tokens sold in the ICO relative to the total supply could affect returns in three important ways. First, if a small percentage of the total tokens are sold in the ICO, the founders might retain a large stake in the project but, if their tokens have no lock-up periods, also have the potential to dump these tokens quickly after the campaign ends and depress the token price. On the other hand, if founders do not retain a significant ownership share, their incentives may not be well aligned with the holders of the tokens. Similar to managers' shareholding, this suggests a potentially nonlinear relation between the percentage of tokens sold and the performance of the token. Third, Catalini and Gans (2018) theoretically explore ICO issuers' commitment in the growth of token supply, and find that the venture return is independent of supply growth, which in our setting suggests no relationship between the token-to-supply ratio and ICO returns. The fourth panel of Table 4 explore this relationship. However, we find neither statistical significance nor monotonicity in portfolio returns sorted by the percent of total token supply sold in the ICO, which could indicate that all three forces are present but no force is dominant.

We then examine the effect of the pricing structure on ICO returns. Issuers often offer a bonus to investors in the ICO as a percentage of their investment during the crowdsale phase. However, a high bonus level give early participants a stronger incentive to sell early, as they are more likely to realize a positive profit than regular, "public" participants. Moreover, instead of (or in addition to) bonuses,

issuers can hold a "pre-ICO" campaign prior to the official ICO, raising funds to cover the expenses of the main campaign. The tokens in a pre-ICO are sold at even steeper discounts. Consequently, pre-ICO investors potentially have the incentive to sell tokens bought before the ICO at the market price, locking in a profit. Therefore, we hypothesize that both high bonuses and pre-ICO campaigns are negative signals for future returns. While the bonus structure does not seem to be significantly related to returns in our main ICO sample, results in the last panel of Table 4 provide supporting evidence: ICOs with pre-sale campaigns, regardless of the bonus structure, tend to have significantly lower returns in both short and medium terms, with the cumulative 180-day return being on average 149.76% (median: 22.05%) lower than ICOs without presales.

Product Quality Characteristics

Our next group of tests examine the the effect of pre-ICO project activities and progress on post-ICO returns. Intuitively, the more work that have already been undertaken, and human capital invested, prior to the ICO, the more legitimate is the offering, as abandonment becomes more costly. Most ICO projects are software in nature. GitHub code depositories of these proposed projects, if available, are usually open to public examination. Subsequent update activities are difficult to manipulate, as users are able to keep track of all update histories. We leverage this feature and use the code update activities and accounts as a proxies for project work and progress. As described in Section 2, we sort our ICO sample into terciles based on the number of GitHub contributor accounts, the number of code repositories, and frequency of code updates. We also construct terciles based on the age of contributor accounts and code depositories. We present the return statistics in Table 5 below.

[Insert Table 5 about here.]

Results in this table consistently support the hypothesis of the effect of product quality on ICO returns. Specifically, we document significantly higher returns for ICO projects with more frequent updates (up to 77.20% higher; 35.94% higher median), more granular project repository structure (53.99%), and codes contributed by more experienced accounts (76.77%) and in older repositories (60.77%), in the first 90 days. Most relations seem to be monotonic, and the median results are also consistent. This suggests that market participants are likely attentive to the actual progress of the proposed projects prior to and during the ICO process, and prefer projects with more tangible activities as they likely offer higher-quality products.

Our final tests in the quality signal category examine the legal status and restrictions of ICOs. First, KYC, or "Know Your Customer" is a requirement that the issuer of the ICO follow rules to verify the identity of the purchaser of the token. Since this is not yet mandatory and is a due diligence requirement, we hypothesize that projects that enforce KYC rules are of higher quality than those that do not. This is especially true because not doing so essentially renders the investors anonymous to the the issuers, significantly increasing information asymmetry and leading to risks of money laundering and future litigation. Similarly, some ICOs do not permit U.S. investors in an effort to avoid oversight by U.S. regulators, especially the SEC. We view this as a negative signal because of the aforementioned risks. We construct two subsamples of ICOs (1) with reported KYC requirements and (2) prohibit participation by US-based investors. We compare their returns with the remaining ICOs without these restrictions, and present results in the last two panels of Table 5. While we do not observe a statistically significant differences in the KYC subsample (not all firms report KYC and those that do not might still require it), we do find lower mean (64.73% in the first 90 days) and and median (15.01%) returns for ICOs where US investors are not permitted to participate.

Behavioral Characteristics

Contrasting with the signaling/quality characteristics are characteristics of the ICO that seem, in our judgment difficult to rationalize. We collect data on seven of these behavioral characteristics and examine their relation to ICO returns in this subsection. First, a number of papers indicate that the price level matters to equity investors, with small investors in particular preferring lower-priced stocks (Schultz 2000). Perhaps most directly related, Fernando et al. (2004) find that IPO day returns are U-shaped in price, with IPOs with an initial price of less than $3 experiencing in excess of a 35% first day return. Given that retail investors might account for a significant portion of ICO participants, they might exhibit similar preferences to lower-priced ICOs, particularly if these offerings are priced in pennies and sub-pennies (more than 50% of our sample ICOs are priced below $0.20 per token). We sort the ICO prices into quintiles and report the mean and median returns in multiple event windows in Table 6 below. Instead of a U-shaped return-to-price relation, we document a monotonically decreasing relation between ICO prices and returns in the first 180 days, with the lowest price quintile having an average cumulative market-adjusted return of 161.86% (16.14% median) lower than the highest price quintile in the first day, extending to 258.58% (45.85% median) at 180 days post-ICO. The return

reversion of high-priced ICOs is also significantly more pronounced than low-priced ICOs. These results are consistent with small investor's preference for low-priced tokens.

[Insert Table 6 about here.]

Next, we perform sentiment analyses on the predominant source of information in an ICO—the whitepaper. Note that we neither analyze nor quantify their informational content in this study, as these papers vary significantly in the ratio of technical to business/boilerplate language.[18] Instead, we only quantify the sentiment-related variables—the tone and uncertainty levels—of the whitepapers. In the IPO literature, Jegadeesh and Wu (2013) document a significantly positive relation between the net tone of the prospectus and first-day returns, while Loughran and McDonald (2013) finds that IPOs with more uncertain prospectus language have higher first-day returns. We sort the ICO sample into terciles based on the tone and uncertainty scores as described in Section 2 and present results in Table 6. We do not find any statistically significant relation between whitepaper sentiment and ICO returns for the main sample, which suggests that market participants by and large ignore the information content of the ICO disclosure, however little there is.[19]

Finally, we examine the sentiment from Bitcointalk posts related to the ICOs in our sample. Recall that Bitcointalk is the predominant discussion forum for ICOs, with issuers having their dedicated threads.[20] The language of posts by non-issuer users in these threads, therefore, serves as a proxy for investor sentiment in the ICO process. The number of posts in these threads could also indicate the level of investor attention. We therefore sort the ICO sample into terciles based on the number of posts in the ICO thread by non-issuer users ranked at "junior member" or above (at least 30 posts), as well as the overall net tone and uncertainty level of all posts combined, prior to the last day of the ICO. We report the results in the last three panels of Table 6. Here again, the return differences are not statistically significant. As indicated in Table 1, ICO whitepapers and posts contain significantly fewer tonal and uncertain words than corporate annual reports and IPO prospectuses. Therefore, an ICO-specific tonal

[18] We analyze the information content of ICO whitepapers in an upcoming study. As an example, Ethereum's whitepaper, available at *https://github.com/ethereum/wiki/wiki/White-Paper*, contains a large amount of technical and mathematical descriptions. In contrast, the whitepaper by Kin, the cryptocurrency of the popular messaging app Kik, available at *https://kinecosystem.org/static/files/Kin_Whitepaper_V1_English.pdf*, are more business-like and contains little technical content.

[19] We are only able to quantify the language of 313 whitepapers, and over 70 whitepapers in our ICO sample have non-English whitepapers for which we do not have a tonal word lexicon similar to Loughran and McDonald (2011).

[20] The alternative discussion forum is Reddit, which receives much less traffic because ICO information on Reddit are not grouped in a single forum such as in Bitcointalk, but in separate "sub-reddits" that requires a separate search process.

lexicon, perhaps a weighted version with weights derived using supervised learning with market returns as training data (Jegadeesh and Wu 2013), might be necessary to accurately quantify languages used in the ICO process.

3.2.2 Calendar-Time Analysis

To further establish the robustness of our event-time results and examine the longer-term tradeability of our ICO characteristics portfolios, we perform the analysis similar to those reported in Section 3.1.2, this time using tercile portfolios constructed in calendar-time on ICO characteristics. Specifically, for each week starting in January 1, 2017, we first sort all coins that have finished an ICO prior to the week into terciles based on each of the 11 quality characteristics and 7 behavioral characteristics discussed in the previous sections. We then form a value-weighted and an equal-weighted portfolio for each tercile. Table 7 below reports the results.

[Insert Table 7 about here.]

In addition, because of the small number of coins in these portfolios (fewer than 10 for many weeks in less-reported characteristics), the results are more likely to be affected by outliers in individual ICO returns. We therefore repeat the analysis on a trimmed sample where the top and bottom 1% of the returns are removed, and present the results in Panel B of Table 7. In this setting, return differences for most variables related to the campaign structure (such as campaign length, ratio between funds raised and hard cap, etc.) lose their statistical significance, particularly for the equal-weighted portfolios. Nevertheless, the return patterns remain robustly significant for important quality-related variables such as most GitHub activities.

4 ICO in the Post-Hype Period

In the latter half of 2018, the aggregate cryptocurrency market lost over 85% of its value. Many unsophisticated "crypto" traders who entered the market purely for short-term speculation in cryptocurrencies exited with significant losses. At the same time, however, the crash of the cryptocurrency market offers an unique opportunity to isolate the key drivers of ICO returns: because utility tokens are usually viewed by unsophisticated investors as equivalent to other cryptocurrencies (despite being backed by a product), the exit of these traders presumably reduced the noise in the valuation process of utility tokens. New ICOs issued during this period might have a significant higher fraction of more "rational"

consumer-investor participants with more interest in the utility of the underlying product. Therefore, factors that remain significantly related to ICO returns during this post-hype period would more likely to persist in the market going forward.

To do so, we examine the relation between campaign, quality, and behavioral characteristics uncovered from the main sample and ICO returns in our post-hype sample of 51 ICOs, and examine the differences. Because of the short period length and the small sample size, we use predictive return regressions instead of sorted portfolios. Specifically, we regress the ICO first day return and the cumulative return at 180 days (30 days for the post-hype sample) on the values of these characteristics prior to the end of the ICO campaigns, as well as country (US/EU/Asia/Others) and year dummies. The coefficient estimates are reported in Table 8 below.

[Insert Table 8 about here.]

First, in contrast to the main sample and the IPO literature, price levels are no longer significantly associated with ICO returns. The coefficient estimate for the price level, while significantly negative for the main sample, become not statistically significant from zero post-hype. In fact, market participants seem to be less subject to behavioral biases in general and are significantly more attentive to the design of the campaign and potential risks: the coefficient for the bonus level, for example, while not statistically significant in the main sample, become significantly negative, and the estimate for the percent of total token supply issued in the offering is significantly positive. Having a pre-sale camaign is also related to significantly lower initial and subsequent returns in the post-hype sample. All three estimates indicate that market participants recognize the dilutive potential of ICOs with high potential future supply levels, and penalize issuers with higher probability of subsequent token dilution. Similarly, campaigns with overly low soft cap levels are viewed with significantly more suspicion. ICOs not accessible to US investors are penalized even more significantly in the post-hype sample, and consistently up to 39% lower short-term returns.

Second, signals of product quality are more significantly related to post-ICO returns. The coefficient estimates of most GitHub related variables are more significant and larger in magnitude in the post-hype sample. Moreover, more attention is paid to the content of disclosures and less to hype. Particularly, project whitepapers with more cautious, risk-related discussions, and thus a more negative overall tone, are associated with higher ICO returns in the post-hype sample. This is consistent with the theoretical

predictions in the IPO market by Beatty and Ritter (1986) and empirical evidence from textual analysis on prospectuses (Loughran and McDonald, 2013).

In totality, evidences presented in this section indicate two shifts in the type of ICO participants post-hype: first, market participants as a whole are becoming more salient to the risks posed by ICOs and are incurring more productive efforts to ascertain the quality of the offering. Second, the quality of the existing product and its risks—its direct consumer utility rather than perceived cash flow growth potential—is increasingly becoming the predominant determinant of ICO returns, which indicates the entry of the ICOs intended target—the actual consumers of the products or services. This has important implications for future theoretical exploration in valuations of ICOs: as consumers and resellers constitutes a larger fraction of ICO market participants, an ideal model should contain more mechanisms from reward-based crowdfunding.

5 Conclusion and Discussion

We conduct one of the first studies of ICOs as a unique and novel fundraising mechanism. We compile a dataset of all trading ICOs from June 2014 to March 2019, and systematically examine the short- and medium-term performance of ICOs in the aggregate and in the cross section. In the aggregate, we demonstrate that ICOs significantly outperform non-ICO coins in both event time and calendar time, but there are significant heterogeneities in returns across ICOs. We relate ICO returns in the cross section to different mechanisms in the IPO and crowdfunding literature along dimensions such as campaign design, information asymmetry on product quality, and investor sentiment in the issuing process. We document that, in the main ICO sample, both short and medium-term returns are significantly related to informational characteristics such as campaign length, funding targets, and pre-ICO project activities, but also to behavioral characteristics such as price levels. In the post-hype ICO sample, while the campaign design-related characteristics remain significant drivers of post-ICO returns, behavioral characteristics cease to be significant and product quality-related characteristics, particularly concrete pre-ICO project activities, become the predominant driver of post-ICO returns. Therefore, as the ICO market matures in the future, it might more similar to a more efficient version of online crowdfunding platforms.

The results of our study should be interpreted considering its limitations. First, our paper focuses on trading ICOs and does not examine ICOs not matched to trading records because, as we discuss in

Section 2, it is difficult to ascertain the exact status of these offerings and they could in fact be trading on smaller exchanges without direct data connection to *coinmarketcap.com*. This focus potentially introduces survivorship bias and as a result, our documented results might be overstated. In related research, we specifically examine the determinants of ICO success and failure using data on pre-trading stage of ICOs, as well as ICOs that have been delisted from exchanges.

Second, because there is little to no financial statement information about ICO firms, we cannot link ICO performance to firm performance. Instead, we take a fact-finding stance and focus on the relation between ex-post performance and ex-ante observed characteristics of the campaigns. Another caveat of our analysis is the relatively short sample length. Because ICOs have only achieved popularity in the last two years, the market is still immature and seems to be dominated by retail investors. Both the fundraising and trading process are likely to change as more sophisticated investors and product end-users enter the market as the primary participants, which, as results from our short post-hype sample indicate, might already be happening. Therefore, a promising future research direction is using longer-term data to examine the changing return dynamics as the market matures.

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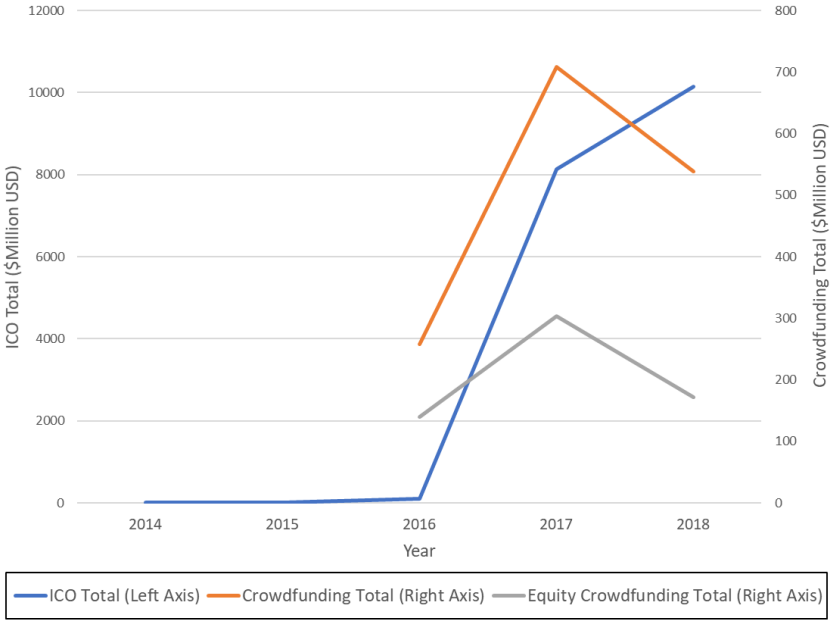
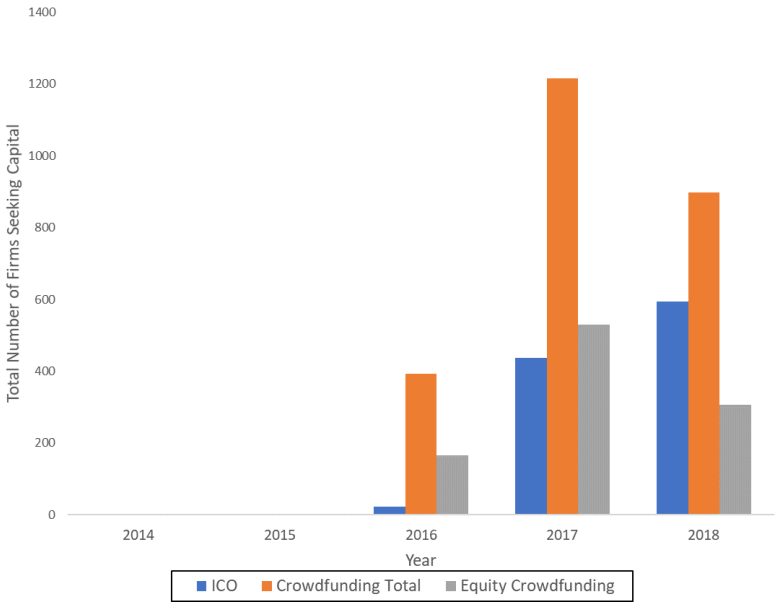
Figure 1. ICO Fundraising vs. Alternative Means, 2014-2018

Panel A of this figure displays the total fund raised (in millions of dollars) for ICOs in our sample, plotted on the left axis, compared to the total amount of SEC-filed Form-C crowdfunding, and the equity subcategory, plotted on the right axis. Panel B displays the total number of issuers seeking funding for the ICO and Form-C samples. The earliest ICO in our sample starts in 2014 and the Form-C data starts in 2016. Both datasets end at the end of 2Q 2018.



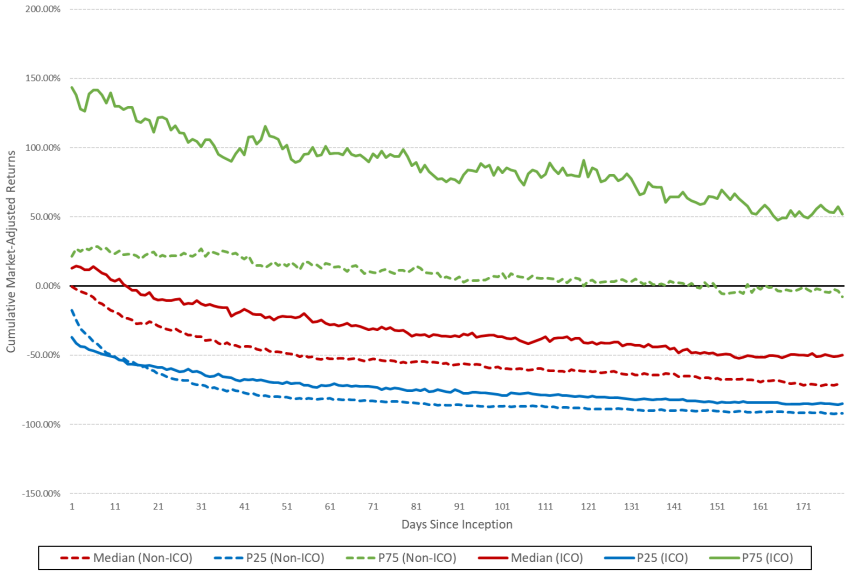
Panel A. Total Amount Raised Via ICO and Form-C Crowdfunding



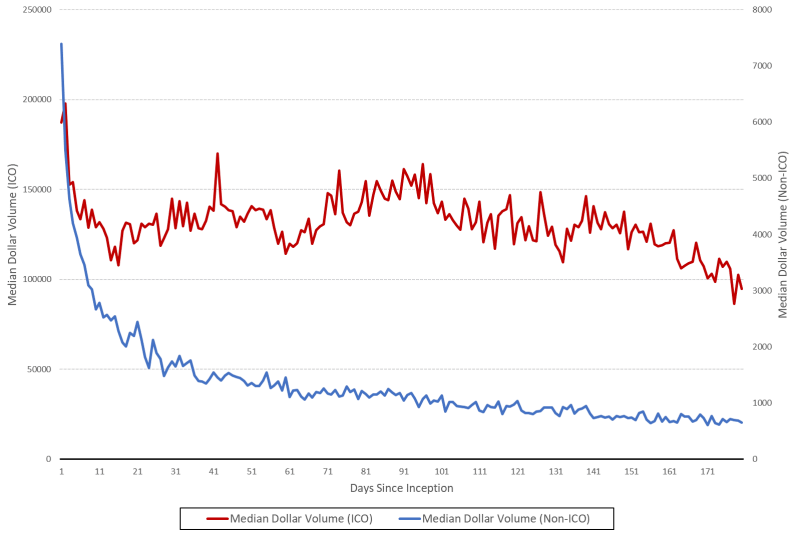
Panel B. Total Number of ICO and Form-C Crowdfunding Campaigns

Figure 2. Event-Time Portfolio Returns: ICO vs. Others

The top panel plots the median, 75th percentile, and 25th percentilen of the ICO (solid lines) and non-ICO (dotted lines) sample cumulative abnormal returns (cumulative returns adjusted by the cumulative return of the value-weighted cryptocurrency market index, described in Section 3.1.1). The returns are computed in event time from one day to 180 days after the end of the ICO for the ICO sample and after the beginning of trading for the non-ICO sample. The bottom panel plots the median trading volume in dollars for the ICO and non-ICO samples.



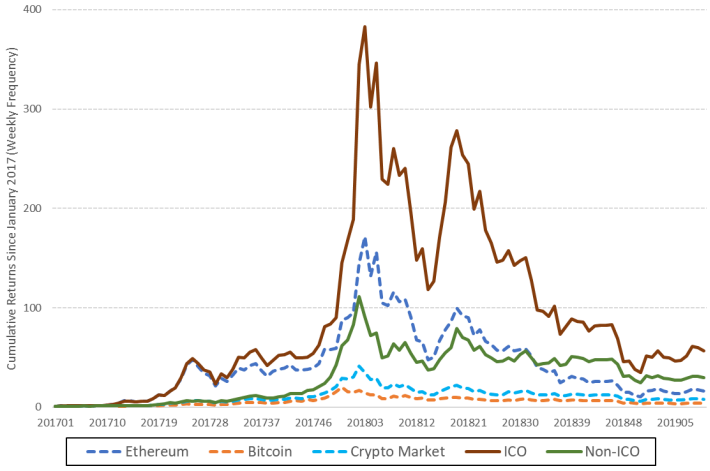
Panel A. Event-Time Portfolio Cumulative Return Distributions (Market-Adjusted)



Panel B. Event-Time Median Trading Volume for ICO and Non-ICO Coins

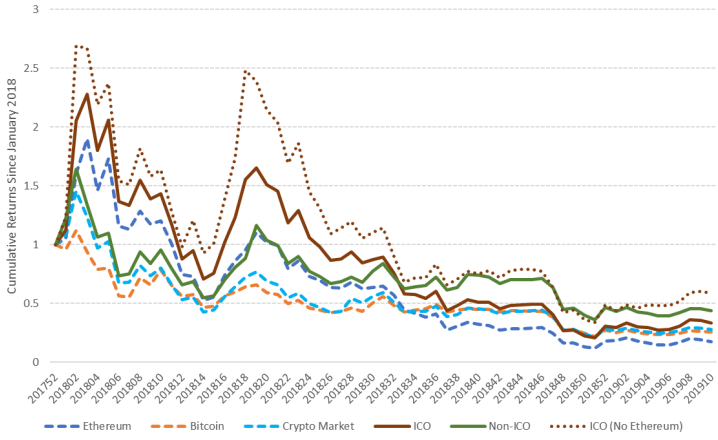
Figure 3. Calendar-Time Portfolio Returns: ICO vs. Others

Panel A plots the cumulative returns of five calendar-time portfolios including (1) the value-weighted ICO portfolio, (2) value-weighted non-ICO portfolio, (3) value-weighted total cryptocurrency market portfolio, (4) Bitcoin, and (5) Ethereum, from January 2017 to June 2018. Panel C plots the same returns from January 2018 to June 2018. Panel B plots the cumulative returns for the value-weighted ICO and non-ICO portfolios, adjusted by the value-weighted market returns.



Panel A. Value-Weighted Calendar-Time Portfolio Cumulative Returns Since 2017

Panel B. Value-Weighted Calendar-Time Portfolio Abnormal Cumulative Returns



Panel C. Value-Weighted Calendar-Time Portfolio Cumulative Returns Since 2018

Table 1. Summary Statistics of Trading ICO Sample

This table reports summary statistics of key return-related features of ICOs in our sample. Campaign length is the number of days between the reported ICO start date and the reported ICO end date. Total amount raised, soft cap, and hard cap levels are the highest reported dollar amounts across our sources. Percent sold is the the number of tokens distributed divided by the total reported token supply. Max bonus is the maximum implied percent discount from the reported ICO bonus structure. Total number of code contributors and repositories are the number of active accounts contributing to the issuer's GitHub project, and the number of project folders, respectively. Total number of code revisions is the number of times that the GitHub code have been modified. ICO price is the highest reported price level in dollars. Whitepaper length is the total number of words in the whitepaper with common stop words removed. Bitcointalk posts count is the number of posts by junior or above Bitcointalk members in the issuer's ICO thread. The net tone levels are the ratio between (positive words-negative words) and the total number of words, and the uncertainty level is the ratio between the number of uncertain words and the total word count. All tonal and uncertain lexicons are from Loughran and McDonald (2011).

Panel A: Main ICO Sample

ICO Features	Mean	S.D.	Median	P10	P90
Signaling Characteristics					
Campaign Length (Days)	38.97	44.15	31.00	6.00	70.00
Total Amount Raised (USD)	22.07	32.68	14.23	1.26	45.49
Soft Cap	319.50	2262.86	4.47	0.41	24.69
Hard Cap	3550.86	36564.12	25.00	3.00	100.00
% Tokens Sold in ICO	50.77	21.18	50.00	25.00	80.00
Max Bonus %	31.25	21.54	25.00	10.00	50.00
Total Number of Code Contributors	12.81	19.08	4	1	41
Total Number of Code Repositories	7.44	8.00	4	1	21
Total Number of Code Revisions/Commits	137.07	170.45	49	5	402
Behavioral Characteristics					
ICO Price (USD)	15.04	313.00	0.17	0.02	1.55
Whitepaper Length (Words)	9159.14	11955.29	5542	1263	19068
Whitepaper Net Tone	-0.44	1.59	-0.20	-2.67	1.29
Whitepaper Uncertainty	1.43	0.96	1.30	0.36	2.65
Bitcointalk Posts Count	110.25	257.63	32	2	250
Bitcointalk Post Net Tone	0.50	1.64	0.54	-0.62	1.95
Bitcointalk Post Uncertainty	0.80	0.70	0.78	0.01	1.36
Panel B: De-hyped ICO Sample					
Signaling Characteristics					
Campaign Length (Days)	49.04	61.93	30.00	1.00	159.00
Total Amount Raised (USD)	12.32	12.81	7.85	2.18	39.40
Soft Cap	8.27	14.82	4.00	0.50	15.00
Hard Cap	73.27	203.34	20.00	4.00	90.00
% Tokens Sold in ICO	49.67	20.61	48.73	23.00	73.00
Max Bonus %	31.72	19.56	27.00	7.00	66.67
Total Number of GitHub Contributors	14.66	29.24	2	1	37
Total Number of GitHub Code Repositories	8.59	9.41	4	1	24
Total Number of GitHub Code Revisions/Commits	96.38	236.75	0	0	225
Behavioral Characteristics					
ICO Price (USD)	0.85	3.83	0.04	0	0.75
Whitepaper Length (Words)	11894.33	17659.08	6842	3639	17205
Whitepaper Net Tone	-1.98	1.95	-0.57	-4.68	0.93
Whitepaper Uncertainty	1.79	1.03	1.32	0.71	3.15
Bitcointalk Posts by Authorized Accounts	813.71	857.52	648	45	1610
Bitcointalk Post Net Tone	2.51	1.35	2.18	1.12	4.22
Bitcointalk Post Uncertainty	1.21	0.51	1.32	0.55	1.74

Table 2. Aggregate Returns of ICO and Non-ICO Coins in Event Time

This table reports mean and median cumulative returns of the ICO and non-ICO samples in event time. For the ICO sample, we compute the event window returns relative to the highest reported ICO price. For the Non-ICO sample, returns are computed based on the opening price of the first trading day. Both mean and median returns are reported in windows ranging from one day to 180 days. For both ICO and non-ICO coins, we report the the unadjusted return in the top row, Bitcoin-adjusted returns in the middle row, and returns adjusted with the value-weighted market index in the bottom row. Numbers in parentheses are *t*-statistics computed using heteroskadasticity-robust standard errors. The numbers below the *t*-statistics are the number of coins used to compute the mean and median returns.

Panel A. ICOs

Type	Mean Returns (Days Since Trading Start)							Type	Median Returns (Days Since Trading Start)						
	1-Day	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		1-Day	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
Raw	180.23%	150.83%	155.73%	140.77%	185.46%	172.82%	362.21%	Raw	15.47%	8.76%	3.29%	-14.70%	-20.04%	-23.27%	-49.50%
	(9.65)	(10.91)	(9.52)	(11.47)	(9.89)	(8.43)	(4.73)		(18.04)	(16.85)	(15.98)	(14.66)	(11.19)	(11.79)	(8.57)
	584	584	584	584	583	583	570		584	584	584	584	583	583	570
BTC-Adj	179.62%	149.24%	154.51%	132.06%	125.95%	93.05%	92.08%	BTC-Adj	14.39%	10.70%	3.27%	-12.87%	-33.41%	-36.97%	-55.64%
	(9.64)	(11.20)	(9.68)	(12.09)	(10.56)	(9.65)	(7.50)		(18.02)	(17.69)	(16.32)	(17.41)	(11.93)	(12.91)	(9.72)
	584	584	584	584	583	583	570		584	584	584	584	583	583	570
Mkt-Adj	179.76%	146.98%	148.83%	118.17%	113.53%	89.71%	77.24%	Mkt-Adj	12.09%	11.39%	3.61%	-10.78%	-27.00%	-36.37%	-49.96%
	(9.64)	(11.29)	(9.87)	(12.49)	(10.49)	(8.97)	(8.66)		(18.22)	(17.99)	(17.23)	(17.92)	(12.44)	(13.72)	(11.08)
	584	584	584	584	583	583	570		584	584	584	584	583	583	570

Panel B. Non-ICO Coins on Coinmarketcap

Type	Mean Returns (Days Since Trading Start)							Type	Median Returns (Days Since Trading Start)						
	1-Day	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		1-Day	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
Raw	48.83%	2467.48%	2767.93%	501.29%	886.86%	590.61%	1131.14%	Raw	0.00%	-6.00%	-14.69%	-29.73%	-41.61%	-45.81%	-52.60%
	(11.04)	(1.49)	(1.49)	(1.98)	(2.57)	(3.10)	(3.47)		(162.69)	(66.89)	(43.44)	(28.55)	(19.94)	(15.75)	(12.30)
	1256	1256	1256	1251	1250	1240	1214		1256	1256	1256	1251	1250	1240	1214
BTC-Adj	48.68%	3119.77%	3355.51%	292.26%	408.70%	246.74%	229.78%	BTC-Adj	0.00%	-6.83%	-16.01%	-36.62%	-52.25%	-55.74%	-68.77%
	(11.03)	(1.48)	(1.47)	(2.21)	(3.11)	(4.30)	(5.77)		(160.66)	(66.92)	(45.83)	(27.80)	(17.64)	(20.76)	(15.58)
	1256	1256	1256	1251	1250	1240	1214		1256	1256	1256	1251	1250	1240	1214
Mkt-Adj	48.65%	2952.74%	3115.42%	285.44%	314.45%	198.20%	150.17%	Mkt-Adj	-0.21%	-6.02%	-17.26%	-36.57%	-51.64%	-56.66%	-71.13%
	(11.03)	(1.48)	(1.45)	(1.88)	(2.72)	(3.56)	(3.11)		(151.20)	(67.36)	(44.57)	(28.17)	(18.77)	(20.35)	(16.16)
	1256	1256	1256	1251	1250	1240	1214		1256	1256	1256	1251	1250	1240	1214

Table 3. Aggregate Returns of ICO and Non-ICO Portfolios in Calendar Time

The top panel reports return statistics of value-weighted and equal-weighted portfolios of the ICO and non-ICO coins in weekly, calendar-time setting. Portfolio weights are adjusted weekly to incorporate newly-issued ICOs during the previous week. As a comparison, we also report the returns of the value- and equal-weighted cryptocurrency market portfolios, Bitcoin and Ethereum returns, and the CRSP value-weighted stock market index return. Panel B reports correlation coefficients between these portfolios. To minimize the effect of outliers on the (particularly equal-weighted) portfolio returns, we also report the same statistics from the trimmed samples where we remove the top and bottom 1% of returns prior to constructing the calendar-time portfolios. SR denotes the Sharpe ratios of these portfolios with the average weekly 3-month T-bill rates as the risk-free returns. High-liquidity portfolios are the same portfolios constructed using only coins with at least $10 million trading volume in the previous week.

Panel A. Weekly Return Statistics of Calendar-Time Portfolios Since January 2017

Portfolios	Full Sample								Trimmed Sample (Top and Bottom 1%)							
	Mean	SD	SR	Median	P25	P75	P10	P90	Mean	SD	SR	Median	P25	P75	P10	P90
All																
ICO (VW)	5.56%	20.60%	0.27	2.60%	-6.93%	12.66%	-18.07%	34.83%	5.26%	19.73%	0.27	2.57%	-6.95%	12.46%	-18.06%	34.76%
Non-ICO (VW)	4.18%	15.23%	0.27	2.90%	-5.93%	13.42%	-14.24%	25.53%	3.56%	14.71%	0.24	2.79%	-5.93%	13.01%	-14.23%	24.57%
ICO (EW)	9.33%	49.07%	0.19	3.97%	-5.29%	12.46%	-17.60%	32.09%	4.52%	18.27%	0.25	3.51%	-6.13%	11.55%	-17.37%	28.72%
Non-ICO (EW)	41.36%	164.90%	0.25	10.97%	1.06%	37.17%	-10.61%	75.05%	5.02%	15.40%	0.32	4.30%	-3.00%	13.90%	-14.04%	23.73%
High Liquidity Portfolios																
ICO (VW)	2.88%	18.74%	0.15	2.84%	-9.43%	11.57%	-18.54%	27.12%	2.61%	17.34%	0.15	2.82%	-9.47%	10.51%	-18.59%	23.07%
Non-ICO (VW)	2.55%	14.87%	0.17	2.55%	-7.85%	9.51%	-15.30%	23.70%	2.34%	14.60%	0.16	2.54%	-7.85%	9.52%	-15.31%	21.72%
ICO (EW)	4.79%	24.72%	0.19	4.93%	-9.43%	11.39%	-20.34%	31.12%	4.18%	21.11%	0.20	4.76%	-8.86%	11.77%	-21.18%	33.35%
Non-ICO (EW)	7.58%	22.86%	0.33	4.62%	-8.23%	12.31%	-17.46%	30.63%	4.23%	17.12%	0.25	4.63%	-8.23%	16.31%	-17.62%	26.73%
Reference																
Crypto Market	2.91%	14.38%	0.20	2.33%	-5.73%	11.59%	-15.71%	20.98%	2.40%	14.10%	0.17	1.49%	-6.29%	10.35%	-15.72%	18.87%
Ethereum	4.29%	19.70%	0.22	-8.55%	12.86%	-16.26%	34.47%	40.84%	4.29%	19.70%	0.22	1.69%	-8.55%	12.86%	-16.26%	34.47%
Bitcoin	2.11%	13.40%	0.16	-6.32%	8.48%	-13.99%	19.42%	23.37%	2.11%	13.40%	0.16	2.27%	-6.32%	8.48%	-13.99%	19.42%
CRSP (VW)	0.14%	1.82%	0.06	0.26%	-0.33%	1.11%	-1.43%	1.82%	0.14%	1.82%	0.06	0.26%	-0.33%	1.11%	-1.43%	1.82%

Panel B. Return Correlation Coefficients

ICO (VW)	1.00								1.00							
Non-ICO (VW)	0.70	1.00							0.70	1.00						
ICO (EW)	0.49	0.46	1.00						0.83	0.79	1.00					
Non-ICO (EW)	0.12	0.13	0.07	1.00					0.78	0.84	0.93	1.00				
Crypto Market	0.81	0.94	0.49	0.25	1.00				0.82	0.97	0.84	0.87	1.00			
CRSP (VW)	0.10	0.08	0.06	0.10	0.10	1.00			0.09	0.08	0.11	0.12	0.09	1.00		

Table 4. Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Campaign Characteristics

Notes for this table can be found at the end of Table 5 below.

Campaign Length

	Mean Returns								Median Returns						
Quintiles	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Short)	186.31%	153.17%	165.97%	98.03%	81.91%	70.82%	54.11%	1 (Short)	47.29%	-5.92%	-7.32%	-4.43%	-3.13%	-12.58%	-34.63%
	(5.44)	(6.53)	(4.21)	(7.21)	(6.85)	(7.31)	(5.24)		(8.39)	(4.8)	(5.4)	(5.89)	(6.68)	(5.13)	(6.48)
2	197.69%	185.50%	138.26%	140.49%	152.19%	131.43%	111.78%	2	34.66%	18.81%	-20.19%	-18.06%	-4.67%	-6.34%	-38.87%
	(4.84)	(5.61)	(6.63)	(6.19)	(5.09)	(3.61)	(4.55)		(8.3)	(8.59)	(3.85)	(3.92)	(5.3)	(2.29)	(4.66)
3	184.01%	95.65%	128.52%	127.11%	133.26%	106.08%	77.11%	3	13.36%	21.11%	-14.27%	-22.50%	16.46%	-7.44%	-38.90%
	(3.48)	(6.7)	(4.06)	(5.31)	(4.88)	(4.74)	(5.04)		(7.83)	(8.86)	(2.99)	(3.66)	(7.8)	(7.44)	(6.36)
4	184.83%	156.06%	172.90%	135.58%	86.55%	62.69%	134.84%	4	19.59%	16.63%	9.74%	-28.61%	-8.72%	-19.44%	-63.41%
	(3.59)	(3.92)	(3.7)	(4.78)	(4.92)	(6.42)	(3.05)		(6.69)	(7.11)	(6)	(3.71)	(6.76)	(6.81)	(1.22)
5 (Long)	139.36%	119.63%	140.36%	69.15%	79.53%	35.77%	-0.36%	5 (Long)	29.72%	-3.22%	5.84%	-61.33%	-23.43%	-27.57%	13.41%
	(4.13)	(4.51)	(3.86)	(4.98)	(3.62)	(4.01)	(4.82)		(6.48)	(7.09)	(8.04)	(1.89)	(3.62)	(5.07)	(21.33)
Diff	-46.95%	-33.54%	-25.61%	-28.88%	-2.38%	-35.06%	-54.46%	Diff	-17.57%	2.70%	13.17%	-56.90%	-20.31%	-14.99%	48.04%
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*p*	<0.001	0.001	0.001	0.003	0.001	0.001	0.288

Amount Raised

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	255.69%	174.05%	179.75%	173.90%	199.26%	118.17%	202.93%	1 (Low)	25.50%	-28.61%	-15.45%	19.87%	-46.71%	-13.67%	-1.22%
	(4)	(4.88)	(4.65)	(4.8)	(4.49)	(5.32)	(3.16)		(5.34)	(4.21)	(5.49)	(9.32)	(4.2)	(5.37)	(6.09)
2	155.60%	117.45%	119.77%	95.35%	80.22%	60.93%	70.70%	2	21.93%	-35.36%	-27.67%	16.63%	18.81%	-20.46%	-6.22%
	(4.76)	(6.28)	(6.78)	(5.93)	(4.07)	(4.47)	(4.93)		(6.39)	(4.38)	(5.34)	(8.74)	(6.18)	(5.15)	(6.78)
3	159.21%	128.90%	81.22%	119.25%	85.35%	59.61%	47.65%	3	21.92%	4.46%	-42.05%	-9.02%	11.63%	-60.22%	-21.24%
	(4.93)	(6.67)	(8.22)	(6.13)	(5.8)	(6.4)	(4.86)		(7.4)	(8.87)	(4.96)	(9.63)	(5.67)	(2.49)	(5.52)
4	166.24%	147.71%	187.42%	141.44%	112.22%	99.43%	61.94%	4	-11.00%	-7.26%	-47.25%	-29.82%	1.47%	16.73%	-20.68%
	(4.47)	(5.15)	(4.2)	(6.14)	(5.52)	(5.87)	(5.13)		(4.86)	(8.22)	(4.15)	(5.82)	(4.66)	(8.15)	(5.64)
5 (High)	122.62%	103.10%	128.52%	48.59%	47.64%	35.04%	13.16%	5 (High)	-18.49%	1.63%	14.13%	-36.58%	7.46%	11.28%	-44.61%
	(4.02)	(5.25)	(3.32)	(7.32)	(6.27)	(6.74)	(6.4)		(3.72)	(6.89)	(6.7)	(4.48)	(6.36)	(6.57)	(4.74)
Diff	-133.07%	-70.95%	-51.23%	-125.31%	-151.62%	-83.12%	-189.77%	Diff	-43.98%	30.25%	29.59%	-56.45%	54.17%	24.95%	-43.39%
p	0.503	0.734	0.884	0.838	0.486	0.901	0.487	*p*	0.676	0.676	0.486	0.676	0.945	0.834	0.522

Amount Raised/Hard Cap Ratio

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	92.21%	64.95%	91.54%	69.31%	73.94%	21.58%	60.89%	1 (Low)	-18.08%	-64.27%	-38.12%	53.58%	-27.67%	-14.48%	4.73%
	(5.08)	(5.17)	(4.06)	(5.14)	(4.73)	(5.66)	(4.07)		(6.89)	(2.63)	(7.32)	(8.72)	(6.12)	(2.18)	(6.39)
2	17.96%	11.90%	4.85%	-0.16%	-11.44%	-15.87%	-6.46%	2	-24.03%	-58.08%	-54.65%	41.92%	54.64%	0.67%	-9.12%
	(9.04)	(9.07)	(9.13)	(7.35)	(5.51)	(5.94)	(4.22)		(6.03)	(2.83)	(6.01)	(8.16)	(6.97)	(3.2)	(6.57)
3	265.58%	227.62%	214.09%	175.01%	132.28%	111.03%	96.06%	3	-31.39%	-16.82%	-55.56%	24.34%	56.71%	-48.77%	-19.96%
	(5.22)	(6.8)	(5.38)	(6.85)	(5.42)	(6.1)	(5.92)		(5.1)	(10.54)	(7.47)	(7.04)	(5.77)	(2.25)	(4.85)
4	140.79%	134.42%	136.02%	146.03%	164.19%	122.81%	62.25%	4	-47.50%	-22.17%	-73.39%	13.34%	32.08%	19.41%	-8.89%
	(5.96)	(7.13)	(6.7)	(5.25)	(4.5)	(4.7)	(4.48)		(4.57)	(10.04)	(3.86)	(8.07)	(4.81)	(6.98)	(6.05)
5 (High)	150.47%	124.73%	166.65%	92.60%	78.74%	66.22%	10.45%	5 (High)	-53.27%	-22.57%	70.86%	-8.06%	6.47%	-1.15%	-52.75%
	(3.84)	(4.83)	(3.32)	(6.4)	(5.82)	(6.48)	(5.14)		(3.39)	(7.91)	(9.77)	(6.12)	(2.81)	(5.82)	(3.45)
Diff	58.27%	59.79%	75.11%	23.29%	4.81%	44.64%	-50.44%	Diff	-35.19%	41.70%	108.98%	-61.64%	34.14%	13.33%	-57.48%
p	0.011	0.010	0.016	0.028	0.087	0.004	0.253	*p*	0.030	0.116	0.030	0.030	0.062	0.002	0.938

Table 4. (Continued) Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Campaign Characteristics

Soft Cap/Hard Cap Ratio

	Mean Returns								Median Returns						
Terciles	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	159.10%	125.21%	109.99%	59.35%	27.62%	-2.86%	-28.69%	1 (Low)	-32.39%	-52.56%	-77.10%	-1.36%	-54.01%	-19.83%	-37.04%
	(2.49)	(2.59)	(2.23)	(3.07)	(2.98)	(5.66)	(4.32)		(6.15)	(4.61)	(3.04)	(5.85)	(3.23)	(4.63)	(3.69)
2	66.56%	81.76%	62.31%	57.60%	25.61%	24.86%	-7.71%	2	-41.91%	-52.29%	25.50%	-21.88%	-69.53%	-20.12%	-39.28%
	(8.92)	(6.6)	(7.79)	(4.61)	(4.33)	(5.79)	(4.87)		(4.9)	(4.6)	(6.73)	(7.56)	(2.71)	(3.92)	(3.63)
3 (High)	113.98%	83.92%	66.76%	84.84%	119.50%	160.79%	36.32%	3 (High)	-41.69%	-57.38%	8.91%	-38.75%	4.46%	-24.02%	-66.47%
	(3.01)	(4.55)	(5.59)	(5.08)	(3.29)	(1.97)	(3.44)		(4.79)	(5.17)	(6.47)	(5.15)	(6.89)	(5.11)	(3.89)
Diff	-45.11%	-41.30%	-43.23%	25.49%	91.88%	163.66%	65.01%	Diff	-9.30%	-4.83%	86.00%	-37.39%	58.47%	-4.19%	-29.43%
p	0.015	0.043	0.039	0.008	0.034	0.031	0.042	*p*	0.320	0.184	0.507	0.046	0.184	0.097	0.159

Percent of Total Token Supply Issued in ICO

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	104.79%	93.78%	102.32%	114.26%	79.39%	53.77%	39.85%	1 (Low)	19.41%	-47.74%	-18.06%	21.48%	-44.61%	-50.38%	3.61%
	(6.72)	(6.76)	(6.73)	(5.37)	(5.05)	(5.03)	(4.08)		(5.99)	(3.63)	(4.85)	(5.94)	(2.91)	(3.98)	(6.68)
2	62.43%	64.73%	54.29%	75.55%	35.33%	22.01%	-8.38%	2	12.23%	-66.37%	-33.53%	18.32%	-15.48%	-49.39%	-19.16%
	(7.22)	(7.84)	(8.59)	(5.36)	(4.91)	(5.59)	(4.81)		(6.37)	(2.33)	(4.76)	(5.13)	(9.83)	(3.98)	(4.91)
3	198.31%	150.84%	163.34%	96.20%	91.12%	70.77%	65.87%	3	14.31%	-7.19%	-51.11%	-6.22%	-31.69%	-74.30%	-37.36%
	(3.84)	(4.25)	(3.63)	(5.68)	(4.95)	(5.25)	(4.75)		(4.98)	(5.88)	(3.7)	(5.64)	(5.38)	(2.98)	(4.32)
4	29.88%	36.78%	21.96%	22.48%	27.16%	15.56%	-30.33%	4	-18.14%	8.28%	-67.20%	-21.73%	-31.39%	0.34%	-41.64%
	(7.57)	(6.06)	(6.18)	(5)	(5.21)	(6.67)	(6.39)		(3.98)	(5.33)	(3.36)	(5.71)	(6.61)	(4.74)	(4.33)
5 (High)	169.20%	152.86%	173.60%	104.30%	74.73%	33.37%	26.54%	5 (High)	-37.42%	-8.03%	29.84%	-31.71%	-43.73%	2.56%	-62.76%
	(2.73)	(3.01)	(2.83)	(3.84)	(3.99)	(5.96)	(4.61)		(2.7)	(5.16)	(6.43)	(4.04)	(5.81)	(6.7)	(4.03)
Diff	64.41%	59.08%	71.28%	-9.96%	-4.66%	-20.40%	-13.32%	Diff	-56.83%	39.71%	47.90%	-53.19%	0.88%	52.94%	-66.37%
p	0.521	0.643	0.609	0.616	0.943	0.759	1.000	*p*	0.343	0.752	1.000	0.752	1.000	0.752	0.577

Maximum Token Bonus Percentage

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	83.81%	68.59%	71.37%	67.03%	30.39%	27.42%	-1.05%	1 (Low)	-6.96%	-29.53%	-68.08%	-25.75%	-42.71%	-32.08%	-45.61%
	(7.17)	(8)	(6.55)	(6.68)	(6.67)	(7.11)	(4.82)		(6.87)	(6.7)	(4.8)	(4.47)	(4.92)	(4.9)	(6.63)
2	42.15%	39.42%	52.57%	39.33%	87.72%	133.12%	64.60%	2	-15.33%	-39.06%	-16.82%	-49.36%	-70.52%	-20.12%	-58.70%
	(8.12)	(6.3)	(5.61)	(5.23)	(3.3)	(1.94)	(3.34)		(6.58)	(5.91)	(6.64)	(3.88)	(3.43)	(5.89)	(5.53)
3 (High)	80.79%	41.90%	9.74%	12.39%	-0.99%	-20.61%	-48.08%	5 (High)	-8.99%	-49.89%	-28.31%	-50.96%	-15.16%	-42.65%	-77.88%
	(3.27)	(4.9)	(9.32)	(4.98)	(4.55)	(6.74)	(7.16)		(6.12)	(5.66)	(5.36)	(4.06)	(7.33)	(6.62)	(3.24)
Diff	-3.02%	-26.69%	-61.62%	-54.64%	-31.39%	-48.03%	-47.03%	Diff	-2.03%	-20.36%	39.77%	-25.21%	27.55%	-10.57%	-32.27%
p	0.147	0.081	0.106	0.045	0.132	0.092	0.042	*p*	0.671	0.887	0.671	0.321	0.479	0.671	0.193

Has Pre-ICO Campaign

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
No	284.39%	226.58%	233.24%	172.53%	176.99%	143.54%	149.82%	No	28.22%	28.50%	-18.49%	-36.78%	-11.58%	-28.15%	-47.48%
	(7.09)	(8.1)	(7.08)	(8.94)	(7.59)	(6.25)	(6.65)		(8.14)	(18.06)	(8.52)	(9.14)	(12.2)	(10.3)	(5.89)
Yes	68.20%	61.84%	59.31%	60.89%	46.50%	32.78%	0.05%	Yes	27.74%	6.26%	-27.08%	-6.96%	-16.02%	-38.75%	-69.53%
	(12.46)	(13.1)	(12.95)	(10.56)	(9.63)	(10.1)	(8.27)		(11.81)	(16.57)	(8.81)	(11.88)	(11.12)	(6.73)	(4.85)
Yes-No	-216.19%	-164.74%	-173.93%	-111.64%	-130.49%	-110.76%	-149.76%	Yes-No	-0.48%	-22.24%	-8.59%	29.82%	-4.44%	-10.59%	-22.05%
p	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	*p*	0.010	0.001	0.001	0.004	0.007	0.089	0.001

Table 5. Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Product Quality Signals

GitHub: Total Number of Code Contributors

	Mean Returns								Median Returns						
Terciles	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	106.79%	101.73%	112.33%	84.62%	102.09%	87.53%	63.28%	1 (Low)	-18.98%	-51.76%	-69.95%	-4.91%	-46.70%	109.53%	22.74%
	(6.03)	(6.21)	(5.22)	(5.74)	(5.34)	(5.38)	(4.76)		(7.82)	(5.29)	(4.38)	(7.18)	(5.58)	(8.16)	(7.26)
2	65.51%	43.32%	45.63%	62.52%	36.52%	7.80%	8.78%	2	-15.64%	-43.64%	11.81%	-18.14%	-64.92%	94.07%	43.50%
	(8.14)	(8.56)	(9)	(5.27)	(5.6)	(7.46)	(3.44)		(7.43)	(5.28)	(8.52)	(9.2)	(5.03)	(6.74)	(6.51)
3 (High)	338.96%	256.24%	245.36%	242.41%	214.97%	147.10%	238.13%	3 (High)	-17.34%	-20.83%	-3.11%	37.04%	101.47%	93.78%	45.63%
	(5.13)	(6.92)	(7.17)	(6.9)	(5.7)	(7.67)	(4.32)		(6.62)	(8.29)	(8.27)	(6.66)	(8.15)	(6.13)	(7.56)
Diff	232.17%	154.51%	133.03%	157.79%	112.88%	59.57%	174.86%	Diff	1.64%	30.92%	66.84%	41.95%	148.17%	-15.75%	22.89%
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*p*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

GitHub: Total Number of Code Repositories

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	95.72%	87.94%	107.62%	77.68%	99.75%	83.45%	65.95%	1 (Low)	-16.82%	-51.76%	-69.83%	-15.89%	-35.76%	94.60%	41.49%
	(5.2)	(5.37)	(4.55)	(4.99)	(4.83)	(4.87)	(4.28)		(8.55)	(4.94)	(3.42)	(7.23)	(5.14)	(8.43)	(5.85)
2	90.60%	70.41%	70.37%	97.54%	72.57%	39.77%	38.37%	2	-15.54%	-45.30%	22.53%	-11.46%	-60.22%	89.62%	25.03%
	(9.32)	(8.92)	(8.79)	(6.79)	(6.25)	(6.56)	(4.59)		(7.05)	(4.9)	(7.25)	(5.93)	(3.75)	(7.15)	(5.67)
3 (High)	334.81%	251.12%	239.01%	225.52%	199.73%	137.44%	224.39%	3 (High)	-7.67%	-20.83%	-0.19%	-27.00%	77.02%	49.85%	2.81%
	(4.93)	(6.63)	(6.85)	(6.35)	(5.3)	(7.22)	(4.04)		(7.2)	(8.23)	(7.55)	(4.75)	(8.23)	(6.66)	(5.07)
Diff	239.10%	163.18%	131.39%	147.84%	99.98%	53.99%	158.44%	Diff	9.14%	30.92%	69.64%	-11.11%	112.78%	-44.75%	-38.68%
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*p*	<0.001	<0.001	<0.001	0.183	0.751	0.668	0.399

GitHub: Total Number of Code Revisions & Commits

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	77.89%	69.10%	82.39%	66.33%	85.19%	66.11%	39.79%	1 (Low)	-19.25%	-14.54%	-46.55%	-24.72%	-6.45%	50.38%	82.67%
	(6.04)	(5.95)	(4.96)	(5.67)	(5.25)	(5.3)	(4.55)		(9.13)	(8.35)	(2.24)	(5.21)	(4.07)	(5.64)	(6.76)
2	109.93%	100.96%	101.49%	120.14%	78.25%	42.91%	65.26%	2	-19.44%	-27.67%	-33.07%	-4.69%	-13.04%	86.32%	49.19%
	(7.18)	(8.03)	(7.78)	(6.03)	(5.67)	(5.96)	(3.74)		(8.63)	(6.48)	(7.87)	(4.66)	(1.85)	(7.06)	(5.99)
3 (High)	341.65%	251.97%	238.30%	222.06%	201.75%	143.30%	222.19%	3 (High)	-17.57%	-21.92%	-26.58%	-17.96%	79.94%	86.32%	83.77%
	(5.08)	(6.69)	(6.91)	(6.4)	(5.47)	(7.46)	(4.16)		(8.5)	(5.85)	(6.43)	(3.31)	(7.76)	(7.06)	(5.15)
Diff	263.76%	182.87%	155.91%	155.73%	116.56%	77.19%	182.40%	Diff	1.68%	-7.39%	19.97%	6.76%	86.39%	35.94%	1.11%
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*p*	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001

Table 5. (Continued) Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Product Quality Signals

GitHub: Average Age of Contributor Accounts

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Old)	249.99%	172.31%	163.53%	156.14%	158.32%	100.76%	190.29%	1 (Old)	35.15%	-0.06%	-15.82%	31.34%	-8.89%	-12.65%	-57.48%
	(4.16)	(5.52)	(5.67)	(5.47)	(4.73)	(6.15)	(3.79)		(8.64)	(6.34)	(4.49)	(5.86)	(6.02)	(7.49)	(3.59)
2	190.35%	158.07%	192.10%	206.86%	172.97%	132.00%	122.81%	2	28.34%	5.06%	54.67%	15.47%	-37.95%	-7.11%	-55.52%
	(7.23)	(8.02)	(6.15)	(6.69)	(6.22)	(6.3)	(5.15)		(7.63)	(4.86)	(8.46)	(5.87)	(3.64)	(6.96)	(4.74)
3 (New)	77.46%	81.29%	59.79%	30.10%	33.55%	23.99%	4.30%	3 (New)	28.98%	-6.70%	27.74%	5.75%	-11.82%	-24.95%	-74.10%
	(6.68)	(5.77)	(7.23)	(8.11)	(5.69)	(5.64)	(4.06)		(7.49)	(5.75)	(5.24)	(5.83)	(7.92)	(7.62)	(3.96)
Diff	-172.53%	-91.02%	-103.74%	-126.04%	-124.77%	-76.77%	-185.98%	Diff	-6.17%	-6.64%	43.56%	-25.59%	-2.92%	-12.31%	-16.62%
p	0.002	0.003	0.011	0.002	<0.001	<0.001	<0.001	*p*	0.007	0.016	0.016	0.058	0.002	0.009	<0.001

GitHub: Average Age of Code Repositories

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Old)	196.52%	143.20%	177.55%	159.91%	191.11%	133.99%	159.67%	1 (Old)	5.12%	-11.73%	-43.29%	3.61%	-35.07%	48.04%	22.56%
	(4.44)	(4.78)	(4.71)	(4.85)	(4.56)	(5.27)	(4.23)		(6.4)	(10.31)	(3.35)	(6.61)	(6.11)	(7.7)	(6.39)
2	130.05%	134.54%	104.56%	99.54%	66.53%	54.18%	98.48%	2	0.10%	-22.50%	24.07%	-9.12%	-59.60%	52.71%	-5.97%
	(7.79)	(6.85)	(7.91)	(7.34)	(7.28)	(6.75)	(3.11)		(8.66)	(6.55)	(7.94)	(5.98)	(4.04)	(7.58)	(6.2)
3 (New)	191.93%	129.69%	134.07%	139.10%	114.71%	73.21%	73.80%	3 (New)	4.73%	-28.61%	11.61%	-26.84%	33.07%	14.61%	-25.79%
	(4.34)	(8.25)	(7.67)	(6.88)	(6.44)	(7.53)	(5.07)		(8.23)	(5.01)	(6.4)	(6.57)	(7.42)	(5.71)	(5.24)
Diff	-4.59%	-13.51%	-43.48%	-20.81%	-76.41%	-60.77%	-85.87%	Diff	-0.40%	-16.89%	54.90%	-30.45%	68.15%	-33.44%	-48.34%
p	0.270	0.142	0.259	0.167	0.314	0.258	0.906	*p*	0.035	0.018	0.065	0.065	0.099	0.099	0.312

Table 5. (Continued) Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Product Quality Signals

KYC Required

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
No	216.30%	172.87%	176.57%	125.24%	130.40%	104.91%	100.37%	No	13.41%	13.98%	-23.13%	-42.45%	8.28%	-14.99%	-37.24%
	(7.91)	(9.13)	(7.96)	(10.01)	(8.48)	(7.11)	(7.23)		(20)	(11.01)	(19.71)	(9.69)	(8.07)	(13.87)	(5.54)
Yes	90.33%	83.14%	81.71%	101.86%	72.95%	53.01%	22.56%	Yes	13.57%	-9.20%	-35.46%	8.42%	-4.61%	-34.00%	-69.83%
	(9.67)	(10.37)	(10.21)	(8.16)	(7.73)	(8.21)	(5.99)		(13.19)	(22.04)	(12.14)	(8.18)	(8.22)	(9.25)	(7.63)
Yes-No	-125.96%	-89.73%	-94.86%	-23.37%	-57.45%	-51.90%	-77.82%	Yes-No	0.16%	-23.17%	-12.32%	50.87%	-12.89%	-19.01%	-32.58%
p	0.336	0.515	0.395	0.996	0.878	0.971	0.040	*p*	0.716	0.362	0.362	0.466	0.286	0.735	0.022

US Investors Prohibited

	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
No	227.41%	178.06%	182.58%	132.44%	136.64%	109.76%	102.59%	No	16.17%	16.63%	-24.36%	-44.15%	11.38%	-18.14%	-36.58%
	(7.96)	(9.07)	(7.93)	(9.94)	(8.44)	(7.08)	(7.15)		(25.53)	(10.38)	(15.51)	(10.49)	(8.15)	(5.84)	(6.95)
Yes	72.39%	76.49%	73.49%	87.00%	62.18%	45.03%	20.22%	Yes	11.61%	-8.35%	-35.46%	5.04%	-4.74%	-33.15%	-62.86%
	(10.64)	(10.86)	(10.61)	(8.68)	(8.2)	(8.67)	(6.56)		(16.11)	(17.22)	(10.64)	(10.6)	(10.32)	(6.05)	(4.43)
Yes-No	-155.01%	-101.57%	-109.10%	-45.43%	-74.45%	-64.73%	-82.37%	Yes-No	-4.57%	-24.98%	-11.10%	49.19%	-16.12%	-15.01%	-26.28%
p	0.057	0.325	0.147	0.504	0.402	0.494	0.081	*p*	0.282	0.858	0.282	0.210	0.385	0.741	0.123

This table, as well as Table 4 above and Table 6 below, report the mean and median event-time cumulative abnormal returns (adjusted with the value-weighted crypcurrency market index described in Section 3.1.1) of our sample ICOs sorted in to either quintiles or deciles by each of the 21 features described in detail in Section 2. Campaign length is the number of days between the reported ICO start date and the reported ICO end date. Total amount raised, soft cap, and hard cap levels are the highest reported dollar amounts across our sources. Percent sold is the the number of tokens distributed divided by the total reported token supply. Max bonus is the maximum implied percent discount from the reported ICO bonus structure. Total number of code contributors and repositories are the number of active accounts contributing to the issuer's GitHub project, and the number of project folders, respectively. Total number of code revisions is the number of times that the GitHub code have been modified. ICO price is the highest reported price level in dollars. Whitepaper length is the total number of words in the whitepaper with common stop words removed. Bitcointalk posts count is the number of posts by junior or above Bitcointalk members in the issuer's ICO thread. The net tone levels are the ratio between (positive words-negative words) and the total number of words, and the uncertainty level is the ratio between the number of uncertain words and the total word count. All tonal and uncertain lexicons are from Loughran and McDonald (2011). KYC required indicates the sample of ICOs that enforce the Know Your Customer requirements. US Investors Prohibited includes the ICOs that restricts US investors from participation. Diff denotes the difference between the top (the 5th quintile or the 3rd tercile) and bottom (the 1st quintile/tercile) groups. *p* and *p*(Diff) denotes the *p*-values from the Mann–Whitney two-sample test (for means) and the nonparametric equality-of-medians test (for medians). Numbers in parentheses are *t*-statistics computed using heteroskadasticity-robust standard errors.

Table 6. Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Behavior-Related Characteristics

Notes for this table can be found at the end of Table 5 above.

Quintiles	ICO Price Level														
	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	266.27%	220.17%	225.77%	199.91%	178.71%	150.87%	217.20%	1 (Low)	63.10%	49.19%	6.47%	11.39%	-63.36%	-53.00%	-32.03%
	(4.53)	(6.41)	(5.66)	(8.18)	(7.7)	(7.8)	(4.56)		(7.17)	(6.42)	(8.39)	(7.12)	(3.74)	(4.96)	(6.29)
2	257.34%	210.30%	205.86%	160.21%	129.24%	68.69%	38.69%	2	64.61%	26.11%	-8.67%	8.58%	-5.87%	-54.01%	-40.86%
	(4.28)	(4.59)	(4.43)	(5.71)	(5.68)	(6.95)	(5.59)		(8.22)	(6.57)	(6.91)	(6.74)	(9.57)	(5.47)	(6.69)
3	149.70%	156.79%	124.51%	142.69%	191.36%	192.74%	123.38%	3	64.92%	28.66%	-25.54%	-18.06%	-13.13%	-70.47%	-54.40%
	(5.13)	(5.17)	(5.49)	(4.81)	(3.86)	(3.17)	(3.8)		(7.28)	(6.82)	(5.36)	(5.7)	(7.67)	(4.49)	(6.07)
4	115.12%	83.79%	135.04%	68.46%	61.78%	42.44%	26.11%	4	50.01%	27.59%	-40.90%	-33.47%	-21.12%	-22.62%	-63.97%
	(4.92)	(5.73)	(3.91)	(5.68)	(5.17)	(5.7)	(4.77)		(5.61)	(8.51)	(6.12)	(5.6)	(7.35)	(5.73)	(4.94)
5 (High)	104.40%	53.01%	21.96%	2.31%	-13.75%	-23.21%	-41.39%	5 (High)	46.96%	31.34%	22.53%	-36.98%	-41.48%	-34.27%	-77.88%
	(3.46)	(4.55)	(5.84)	(5.9)	(6.93)	(6.24)	(5.5)		(7.8)	(9.09)	(7.16)	(5.22)	(6.78)	(6.59)	(3.72)
Diff	-161.86%	-167.16%	-203.81%	-197.60%	-192.45%	-174.08%	-258.58%	Diff	-16.14%	-17.85%	16.06%	-48.37%	21.88%	18.73%	-45.85%
p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	*p*	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Whitepaper Length														
	Mean Returns								Median Returns						
Terciles	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Short)	136.96%	85.41%	75.72%	76.45%	74.94%	57.79%	41.37%	1 (Short)	14.27%	-11.28%	-48.77%	-23.63%	-59.23%	-5.93%	-28.37%
	(4.25)	(7.5)	(7.82)	(5.44)	(5.81)	(5.49)	(4.96)		(6.93)	(8.32)	(3.63)	(8.55)	(4.11)	(4.21)	(5.73)
2	36.68%	56.49%	30.56%	44.48%	30.77%	21.14%	76.82%	2	21.48%	-24.36%	-19.54%	-42.69%	-76.18%	4.73%	-39.10%
	(8.22)	(4.41)	(5.63)	(4.91)	(4.43)	(4.41)	(2.28)		(7.13)	(4.48)	(7.23)	(6.93)	(2.5)	(4.3)	(4.69)
3 (Long)	125.17%	125.94%	173.11%	151.63%	124.29%	94.57%	42.36%	3 (Long)	17.81%	-44.85%	-26.70%	-51.94%	-7.44%	-1.37%	-62.86%
	(5.84)	(6.41)	(4.42)	(5.2)	(4.05)	(3.59)	(4.2)		(7.47)	(3.59)	(5.93)	(4.47)	(4.95)	(5.83)	(3.96)
Diff	-11.79%	40.53%	97.40%	75.18%	49.34%	36.78%	0.99%	Diff	3.54%	-33.57%	22.07%	-28.31%	51.79%	4.55%	-34.50%
p	0.373	0.772	0.940	0.554	0.850	0.641	0.357	*p*	0.268	0.605	0.825	0.711	0.825	0.711	0.408
	Whitepaper Net Tone														
	Mean Returns								Median Returns						
	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day		ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Neg)	64.83%	85.55%	72.08%	55.21%	44.72%	18.22%	20.85%	1 (Negative)	-3.11%	-14.34%	-49.78%	-8.12%	-54.21%	7.14%	-43.64%
	(6.41)	(6.39)	(4.64)	(5.99)	(4.97)	(7.55)	(6.3)		(7.42)	(7.79)	(3.97)	(4.01)	(3.8)	(6.78)	(4)
2	83.59%	93.21%	83.70%	74.92%	52.15%	29.65%	99.87%	2	-4.21%	-22.50%	-11.49%	-26.44%	-72.76%	-8.93%	-47.74%
	(8.16)	(5.45)	(6.88)	(5.6)	(4.96)	(4.65)	(2.4)		(5.39)	(6.11)	(4.67)	(5.34)	(3.48)	(5.98)	(3.66)
3 (Pos)	150.23%	88.79%	123.68%	143.03%	133.61%	126.42%	42.14%	3 (Positive)	1.47%	-32.06%	-9.30%	-38.56%	-4.31%	-20.03%	-68.70%
	(4.1)	(5.8)	(4.15)	(4.7)	(4.2)	(3.82)	(4.19)		(7.51)	(5.82)	(4.87)	(4.5)	(6.3)	(6.9)	(3.82)
Diff	85.40%	3.24%	51.60%	87.81%	88.89%	108.20%	21.29%	Diff	4.57%	-17.72%	40.48%	-30.44%	49.91%	-27.17%	-25.06%
p	0.826	0.661	0.863	0.772	0.585	0.685	0.351	*p*	0.883	0.883	0.658	0.883	0.302	0.302	0.334

Table 6. (Continued) Market-Adjusted Cumulative ICO Returns in Event Time Sorted by Behavior-Related Characteristics

Whitepaper Uncertainty

Mean Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	160.14%	107.25%	130.16%	136.15%	107.92%	121.63%	134.34%
	(4.21)	(6.13)	(4.35)	(4.59)	(3.98)	(3.68)	(2.74)
2	51.82%	59.91%	49.16%	65.81%	44.10%	15.75%	-4.42%
	(9.48)	(7.04)	(7.29)	(5.92)	(5.8)	(7.35)	(5.25)
3 (High)	86.94%	100.88%	100.45%	71.02%	78.19%	36.88%	35.04%
	(6.54)	(5.2)	(4.76)	(5.7)	(4.5)	(5.26)	(4.83)
Diff	-73.20%	-6.38%	-29.71%	-65.12%	-29.73%	-84.74%	-99.30%
p	0.782	0.704	0.885	0.933	0.725	0.480	0.926

Median Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Short)	-10.49%	-16.47%	-60.72%	-20.09%	-55.27%	-1.25%	-23.59%
	(5.46)	(7.23)	(3.5)	(5.56)	(3.38)	(4.63)	(6.4)
2	12.23%	-37.36%	-2.41%	-26.32%	-74.60%	4.58%	-31.52%
	(7.08)	(4.73)	(6.36)	(6.1)	(3.09)	(6.81)	(6.77)
3 (Long)	10.59%	-53.71%	-10.26%	-49.47%	-5.87%	-14.99%	-54.10%
	(6.14)	(3.32)	(5.49)	(2.86)	(6.79)	(6.52)	(4.45)
Diff	21.08%	-37.24%	50.46%	-29.38%	49.40%	-13.74%	-30.51%
p	0.711	0.825	0.825	0.941	0.336	0.120	0.651

Bitcointalk Posts by Active Accounts

Mean Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	209.83%	184.40%	197.94%	118.43%	103.80%	76.93%	55.28%
	(5.14)	(5.44)	(4.26)	(7.25)	(6)	(7.5)	(6.26)
2	120.94%	112.73%	104.38%	106.60%	111.86%	70.97%	61.10%
	(4.57)	(4.53)	(5.45)	(4.57)	(4.06)	(5.4)	(3.09)
3 (High)	272.94%	150.13%	164.62%	156.62%	132.59%	113.35%	170.41%
	(4.17)	(6.6)	(5.19)	(5.73)	(6.08)	(5.97)	(3.63)
Diff	63.12%	-34.27%	-33.32%	38.19%	28.79%	36.42%	115.12%
p	0.661	0.639	0.889	0.856	0.823	0.447	0.329

Median Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	12.09%	-7.04%	-25.57%	21.92%	-39.98%	11.28%	-14.48%
	(7.24)	(6.15)	(4.52)	(7.83)	(4.3)	(6.57)	(7.14)
2	19.87%	-7.32%	14.13%	-7.92%	-47.25%	14.31%	-30.46%
	(10)	(5.26)	(5.98)	(8.01)	(4.17)	(8.01)	(5.08)
3 (High)	22.08%	-8.06%	6.66%	-23.13%	9.25%	-2.25%	-42.04%
	(8.59)	(6.16)	(6.28)	(4.61)	(5.13)	(6.98)	(4.85)
Diff	9.99%	-1.02%	32.23%	-45.06%	49.22%	-13.53%	-27.56%
p	0.843	0.469	0.644	0.948	0.598	0.187	0.183

Bitcointalk Post Net Tone

Mean Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Neg)	256.86%	141.63%	129.58%	139.23%	105.96%	62.07%	82.46%
	(4.09)	(4.91)	(5.67)	(5.07)	(4.1)	(5.73)	(3.35)
2	219.52%	195.63%	182.46%	147.97%	127.51%	113.83%	101.71%
	(5.14)	(5.95)	(5.25)	(5.76)	(6.34)	(6.25)	(5.08)
3 (Pos)	130.87%	112.14%	157.57%	95.06%	114.54%	85.29%	104.22%
	(4.47)	(5.48)	(3.8)	(6.81)	(5.58)	(6.38)	(3.08)
Diff	-125.99%	-29.49%	27.99%	-44.17%	8.58%	23.22%	21.76%
p	0.567	0.832	0.589	0.566	0.837	0.784	0.908

Median Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	12.09%	7.34%	-42.39%	23.38%	-33.23%	13.21%	-21.72%
	(6.31)	(6.67)	(4.97)	(8.22)	(3.65)	(6.97)	(6.6)
2	5.77%	-9.97%	12.20%	-16.79%	-42.04%	16.46%	-25.41%
	(6.71)	(7.51)	(5.83)	(5.46)	(3.67)	(7.76)	(5.31)
3 (High)	24.72%	-18.45%	11.61%	-20.07%	18.81%	-2.25%	-35.53%
	(9.06)	(6.71)	(6.57)	(4.15)	(6.42)	(8.34)	(4.2)
Diff	12.63%	-25.79%	54.00%	-43.45%	52.04%	-15.46%	-13.81%
p	0.740	0.550	0.320	0.466	0.595	0.595	0.735

Bitcointalk Post Uncertainty

Mean Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	147.11%	85.47%	98.86%	116.94%	96.36%	82.93%	117.66%
	(3.85)	(7.16)	(5.95)	(6.38)	(5.65)	(6.3)	(3.2)
2	208.32%	185.41%	226.53%	118.38%	96.27%	77.17%	41.44%
	(4.7)	(5.21)	(4.11)	(5.95)	(5.95)	(5.94)	(4.42)
3 (High)	251.78%	178.86%	144.36%	147.00%	155.73%	101.62%	128.47%
	(4.65)	(5.36)	(6.07)	(5.03)	(4.7)	(6.09)	(4.02)
Diff	104.67%	93.39%	45.50%	30.06%	59.37%	18.68%	10.80%
p	0.083	0.076	0.167	0.513	0.193	0.315	0.837

Median Returns

	ICO	5-Day	10-Day	30-Day	60-Day	90-Day	180-Day
1 (Low)	7.39%	-9.20%	-31.00%	10.59%	-33.93%	25.50%	-13.67%
	(9.12)	(7.01)	(3.82)	(7.69)	(4.95)	(6.71)	(4.62)
2	-1.25%	-23.59%	18.46%	6.47%	-48.77%	39.74%	-20.57%
	(7.88)	(4.04)	(7.53)	(7.62)	(4.48)	(7.54)	(4.78)
3 (High)	-1.47%	-23.25%	-1.15%	-17.68%	13.41%	-7.04%	-34.52%
	(6.77)	(5.37)	(7.52)	(7)	(4.94)	(5.44)	(4.29)
Diff	-8.86%	-14.06%	29.85%	-28.27%	47.34%	-32.53%	-20.85%
p	0.466	0.207	0.073	0.642	0.506	0.506	0.738

Table 7. Characteristics-Sorted ICO Portfolios in Calendar Time

This table reports return statistics of characteristics-sorted ICO portfolios in weekly, calendar-time setting. Portfolio cutoffs are adjusted weekly to incorporate characteristics of newly-issued ICOs during the previous week. Both value-weighted and equal-weighted portfolios are used. To minimize the effect of outliers, in Panel B we also report the same statistics from the trimmed samples where we remove the top and bottom 1% of returns prior to constructing the calendar-time portfolios. Standard errors for the median differences are computed using the nonparametric equality-of-medians test. Other numbers in parentheses are t-statistics computed using Newey-West standard errors with up to 20 lags.

Panel A. Full ICO Sample

	Equal-Weighted Quintile Portfolios				Value-Weighted Quintile Portfolios			
	1	2	3	(3-1)	1	2	3	(3-1)
Campaign Characteristics								
Campaign Length	1.94%	2.98%	10.67%	8.73%	4.79%	6.35%	0.83%	-3.96%
	(1.26)	(1.93)	(1.23)	(0.14)	(2.12)	(2.29)	(0.76)	(-2.34)
Amount Raised	2.80%	1.79%	2.45%	-0.35%	5.30%	2.43%	3.12%	-2.17%
	(1.67)	(1.29)	(1.35)	(-0.26)	(1.92)	(1.62)	(1.91)	(-1.12)
Amount Raised/Hard Cap Ratio	3.51%	2.51%	0.38%	-3.13%	6.16%	3.83%	3.76%	-2.40%
	(1.98)	(1.38)	(0.26)	(-2.36)	(2.24)	(1.25)	(1.39)	(-1.72)
Percent of Total Token Supply Issued in ICO	17.54%	-2.18%	1.83%	-15.72%	18.92%	2.52%	4.48%	-14.44%
	(1.15)	(-0.90)	(0.90)	(-1.01)	(1.18)	(1.53)	(1.84)	(-1.38)
Maximum Token Bonus Percentage	14.48%	0.69%	3.33%	-11.15%	18.33%	2.73%	3.92%	-14.41%
	(1.15)	(0.33)	(1.33)	(0.58)	(1.17)	(1.54)	(2.27)	(-0.96)
Soft Cap/Hard Cap Ratio	-0.34%	1.86%	2.50%	2.85%	12.48%	5.96%	5.32%	-7.16%
	(-0.11)	(1.21)	(1.27)	(-0.24)	(2.78)	(1.76)	(1.30)	(-1.60)
Product Quality Characteristics								
Total Number of GitHub Contributors	2.98%	1.56%	6.46%	3.48%	2.34%	4.25%	7.29%	4.95%
	(1.81)	(1.11)	(1.49)	(1.90)	(1.37)	(2.02)	(1.83)	(1.87)
Total Number of Code Repositories	1.42%	2.91%	6.34%	4.93%	2.15%	5.92%	6.83%	4.68%
	(1.14)	(1.60)	(1.84)	(1.96)	(1.28)	(2.36)	(1.92)	(1.58)
Total Number of Code Revisions/Commits	1.57%	2.69%	6.71%	5.14%	2.17%	6.03%	6.88%	4.70%
	(1.20)	(1.63)	(1.80)	(1.83)	(1.29)	(2.48)	(1.87)	(1.55)
Average Age of GitHub Contributors	4.03%	3.22%	3.75%	-0.28%	6.56%	6.09%	1.93%	-4.64%
	(1.40)	(1.55)	(2.10)	(-0.16)	(2.91)	(1.96)	(1.16)	(-2.68)
Average Age of GitHub Repositories	3.05%	3.27%	4.85%	1.80%	7.82%	4.82%	1.74%	-6.08%
	(2.00)	(1.47)	(1.56)	(0.77)	(2.11)	(2.18)	(1.03)	(-1.84)
Behavioral Characteristics								
ICO Price	3.01%	2.23%	14.05%	11.04%	6.70%	2.66%	3.92%	-2.78%
	(1.60)	(1.48)	(1.25)	(1.07)	(2.33)	(1.40)	(2.17)	(-1.73)
Whitepaper Length	11.40%	0.00%	2.07%	-9.33%	1.50%	2.34%	4.59%	3.09%
	(1.37)	(-0.00)	(1.48)	(-1.33)	(0.87)	(2.18)	(2.31)	(1.59)
Whitepaper Net Tone	1.44%	2.01%	6.72%	5.29%	3.50%	2.25%	3.85%	0.35%
	(1.10)	(1.80)	(1.33)	(1.30)	(2.35)	(1.07)	(1.69)	(0.19)
Whitepaper Net Uncertainty	20.37%	1.42%	1.04%	-19.33%	1.58%	2.85%	3.44%	1.86%
	(1.35)	(1.11)	(0.80)	(-1.33)	(0.92)	(2.21)	(2.23)	(1.05)
Bitcointalk Posts	3.99%	9.11%	5.30%	1.31%	2.05%	3.97%	4.59%	2.54%
	(1.59)	(1.37)	(1.24)	(1.12)	(1.19)	(2.51)	(1.78)	(1.59)
Bitcointalk Post Net Tone	13.78%	4.66%	1.85%	-11.93%	1.91%	5.41%	4.51%	2.60%
	(1.58)	(1.75)	(1.25)	(-1.53)	(1.13)	(1.58)	(2.35)	(1.97)
BitcoinTalk Post Uncertainty	3.94%	20.00%	10.85%	6.91%	6.84%	4.66%	1.64%	-5.21%
	(1.61)	(1.23)	(1.39)	(1.28)	(1.95)	(2.12)	(0.96)	(-1.81)

Table 7. (Continued) Characteristics-Sorted ICO Portfolios in Calendar Time

Panel B. Trimmed ICO Sample (Top and Bottom 1% Removed)

	Equal-Weighted Quintile Portfolios				Value-Weighted Quintile Portfolios			
	1	2	3	(3-1)	1	2	3	(3-1)
Signaling Characteristics								
Campaign Length	2.08%	2.96%	2.96%	0.88%	4.93%	6.39%	1.28%	-3.65%
	(1.63)	(2.05)	(2.07)	(1.62)	(2.49)	(2.30)	(1.18)	(-2.71)
Amount Raised	2.76%	2.37%	2.29%	-0.47%	4.78%	2.93%	3.56%	-1.22%
	(2.13)	(1.69)	(1.65)	(-0.83)	(1.75)	(1.95)	(2.19)	(-0.61)
Amount Raised/Hard Cap Ratio	3.36%	2.75%	0.87%	-2.49%	5.24%	4.31%	3.39%	-1.84%
	(2.10)	(1.67)	(0.66)	(-1.90)	(2.44)	(1.38)	(1.59)	(-1.02)
Percent of Total Token Supply Issued in ICO	2.97%	-1.54%	2.35%	-0.63%	12.13%	2.19%	4.93%	-7.19%
	(1.68)	(-0.68)	(1.23)	(-0.25)	(2.38)	(1.52)	(2.06)	(-1.00)
Maximum Token Bonus Percentage	7.61%	3.34%	3.03%	-4.58%	5.06%	4.38%	0.73%	-4.33%
	(1.76)	(1.49)	(1.54)	(0.72)	(2.36)	(2.05)	(2.67)	(-0.86)
Soft Cap/Hard Cap Ratio	-0.86%	2.02%	3.51%	4.36%	7.87%	6.48%	5.30%	-2.58%
	(-0.38)	(1.14)	(1.57)	(1.31)	(2.69)	(1.91)	(1.33)	(-0.98)
Product Quality Characteristics								
Total Number of GitHub Contributors	-0.74%	0.64%	1.54%	2.27%	1.88%	2.32%	4.06%	2.18%
	(-1.73)	(1.43)	(1.90)	(2.06)	(0.90)	(2.23)	(2.25)	(2.17)
Total Number of Code Repositories	-0.71%	0.70%	1.01%	1.71%	1.68%	3.93%	3.91%	2.24%
	(-0.87)	(0.41)	(0.56)	(1.97)	(0.78)	(2.91)	(2.35)	(2.27)
Total Number of Code Revisions/Commits	-0.77%	0.35%	1.10%	1.87%	1.73%	3.53%	3.93%	2.20%
	(-1.99)	(1.24)	(2.06)	(2.05)	(0.82)	(4.49)	(2.13)	(2.23)
Average Age of GitHub Contributors	1.11%	1.02%	-0.91%	-2.03%	5.79%	1.96%	1.69%	-4.10%
	(0.57)	(0.76)	(-0.84)	(-0.09)	(3.54)	(1.26)	(0.81)	(-2.19)
Average Age of GitHub Repositories	1.23%	-0.24%	0.20%	-1.03%	4.01%	1.80%	1.52%	-2.49%
	(1.89)	(-0.47)	(1.722)	(-1.87)	(2.43)	(1.43)	(1.71)	(-2.08)
Behavioral Characteristics								
ICO Price	3.19%	2.23%	2.46%	-0.73%	6.57%	3.21%	4.25%	-2.32%
	(1.91)	(1.79)	(2.04)	(-0.89)	(2.41)	(1.69)	(2.35)	(-1.98)
Whitepaper Length	1.04%	-0.58%	-0.12%	-1.16%	1.94%	1.92%	3.00%	1.05%
	(0.71)	(-0.87)	(-0.14)	(-1.18)	(1.13)	(2.17)	(2.46)	(0.57)
Whitepaper Net Tone	0.22%	0.41%	-0.41%	-0.63%	3.13%	2.14%	1.47%	-1.66%
	(0.22)	(0.38)	(-0.55)	(-1.20)	(2.12)	(1.18)	(1.45)	(-1.10)
Whitepaper Net Uncertainty	1.19%	-0.16%	-0.60%	-1.79%	2.00%	1.68%	2.54%	0.54%
	(0.97)	(-0.17)	(-0.78)	(-1.99)	(1.16)	(1.90)	(1.99)	(0.31)
Bitcointalk Posts	0.99%	-0.61%	0.73%	-0.27%	2.26%	0.70%	2.71%	0.45%
	(0.65)	(-0.89)	(0.63)	(-0.52)	(1.32)	(0.86)	(1.77)	(0.49)
Bitcointalk Post Net Tone	0.06%	1.31%	-0.22%	-0.28%	2.23%	2.40%	2.41%	0.19%
	(0.06)	(0.88)	(-0.26)	(-0.61)	(1.32)	(1.40)	(1.87)	(0.20)
BitcoinTalk Post Uncertainty	0.55%	0.23%	0.34%	-0.21%	3.98%	2.76%	1.98%	-2.00%
	(0.47)	(0.19)	(0.36)	(-0.31)	(1.81)	(2.05)	(1.16)	(-1.43)

Table 8. Return Drivers for Pre- and Post-Hype ICOs

This table reports the coefficient estimates from the predictive regression $R_{i,t,t+n} = \alpha + \beta X_{i,t-1} + \epsilon_i$ for the main and post-hype ICO samples. The dependent variable $R_{i,t,t+n}$ is the cumulative market-adjusted first day of trading and in the first 180 days (the first 30 days for the post-hype sample). The independent variables in $X_{i,t-1}$ are related to campaign design, product quality, and behavioral issues and are described in detail in Section 2. All independent variables are values available prior to the conclusion of the ICO campaign. Country dummies denote whether the ICO issuer is located in (1) US, (2) Europe, (3) Asia Pacific, and (4) other regions.

Dependent Variable: Crypto Market-Adjusted Returns				
	Hype Sample		De-hyped Sample	
	(1)	(2)	(3)	(4)
	First-Day	180-Day	First-Day	30-Day
Campaign Length	-0.052	-0.006	0.005	-0.006
	(-0.88)	(-0.80)	(0.39)	(-0.31)
Amount Raised/Hard Cap	1.166	0.560	-1.440	-1.702
	(0.72)	(0.43)	(-1.53)	(-0.91)
Soft Cap/Hard Cap	0.079	0.077	4.526**	7.451*
	(0.78)	(0.90)	(2.24)	(1.83)
Percent of Tokens Issued in ICO	-3.280	-0.649	2.594*	2.893*
	(-0.98)	(-0.51)	(1.94)	(1.83)
Maximum Bonus Percentage	-1.626	-2.199*	-1.312**	-1.765**
	(-0.95)	(-1.84)	(-2.27)	(-2.14)
GitHub: Number of Contributing Accounts	-0.002	0.164	0.017	0.024*
	(-0.02)	(1.64)	(1.72)	(1.93)
GitHub: Number of Code Repositories	0.008	-0.217	0.065	0.269*
	(0.02)	(-1.35)	(1.26)	(1.92)
GitHub: Number of Code Revisions	0.008	0.008	0.009**	0.006***
	(0.62)	(1.41)	(2.35)	(2.70)
GitHub: Average Age of Contributing Accounts	0.001	0.001	0.001*	0.002
	(0.58)	(1.12)	(1.91)	(1.45)
Has Pre-ICO Campaign	-0.761	-0.145	-1.579***	-1.481
	(-1.47)	(-0.31)	(-2.93)	(-1.56)
KYC Required	0.1122	0.008	-0.601	0.049
	(0.58)	(1.58)	(-0.48)	(0.52)
US Investors Prohibited	0.886	0.547	-0.376**	-0.399**
	(0.95)	(1.40)	(-2.18)	(-2.15)
ICO Price Level	-0.002*	-0.001*	0.209	-0.115
	(-1.81)	(-1.89)	(0.58)	(-0.15)
Whitepaper Length	-0.000	-0.000	-0.000	-0.000
	(-0.88)	(-0.99)	(-0.32)	(-0.45)
Whitepaper Net Sentiment	2.888	-1.861	-6.320***	-5.485**
	(1.01)	(-0.14)	(-2.90)	(-2.25)
Bitcointalk: Number of Posts by Authorized Accounts	0.006	0.000	0.001	0.001
	(0.90)	(0.31)	(1.31)	(1.18)
Bitcointalk Post Net Sentiment	-20.517	19.517	4.319	-12.498
	(-0.51)	(0.95)	(0.04)	(-0.16)
Country Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
No. Obs	588	574	51	46
R^2	0.035	0.056	0.726	0.705