Initial Coin Offerings (ICOs): The role of Social Media for Organizational Legitimacy and Underpricing

Completed Research Paper

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Abstract

Recently, Initial Coin Offerings (ICOs) have developed substantial influence as a funding mechanism while being largely neglected by research. In parallel, microblogs were identified as a source of organizational legitimacy and underpricing in Initial Public Offerings. In this paper, we investigate the influence of different types of social media, specifically microblogs and discussion forums, on organizational legitimacy in the realm of ICOs. As legitimacy cannot be measured directly, we follow renowned scholars and use underpricing as the dependent variable and an established proxy for legitimacy. We analyze data of 95 ICOs and provide first results indicating that discussion forum activity confers organizational legitimacy. Additionally, we show that the influence of strategic twitter management by the legitimacy-accruing organization is mediated by the activity of independent users on discussion forums. Furthermore, we introduce the phenomenon ICO as a funding mechanism fundamentally based on information technology and motivate further research on this topic.

Keywords: Blockchain, Initial Coin Offering (ICO), Token Sale, Social Media, Organizational Legitimacy, Underpricing.

Introduction

An Initial Coin Offering (ICO[1]) is a novel type of financing mechanism based on blockchain[2] technology, in which funding is exchanged in return for new coins[3] that are issued on a blockchain (Dell'Erba 2017). This process is executed by computer protocols on a blockchain, named smart contracts, which fully automate the key constituents of the funding process. Hence, the essence of an ICO is based on Information Technology (IT), as we introduce in this paper in detail. The similarity to Initial Public Offerings (IPOs) (e.g., fund raising through security release) gave birth to the name ICO, which also contain features of crowdfunding (e.g., publicly open to individual investors) and venture capital (VC) (e.g., very early stage investments) (Dell'Erba 2017). ICOs have developed tremendous influence over the

[1] We use the term ICO throughout this paper to refer to blockchain funding mechanism, although many other terms exist, for example Token Sale, Token Launch or Token Generation Event (TGE) – mainly to increase readability and because a clear definition and usage of the terms has yet to emerge in the quickly evolving blockchain landscape

[2] We use the term blockchain to refer to all kind of distributed ledger technologies (DLT) for similar reasons as in [1]

[3] We use the term coin to refer to all units of exchange of blockchains, comprising tokens and altcoins, for similar reasons as in [1]

last year and are now the leading funding mechanism for blockchain related startups. More capital was raised through ICOs than through traditional VC in 2017 in the blockchain industry, totaling to a similar size as *all* VC internet investments in a typical quarter (Chanson et al. 2018). To be precise, Coindesk (2018) reports $5.4B ICO funding in 2017. Undoubtedly, ICOs are a very recent and still emerging phenomenon: Whereas before April 2017 usually under $20M were funded through ICOs per month, a strong growth set in as of then, culminating in the first quarter of 2018 raising over $6B (CoinDesk 2018). Initially, only startups rooted in the blockchain community sought funding through ICOs, aiming at the initial launch of their product. Accordingly, raised amounts were typically in the range of a few million dollars, as in early traditional VC rounds (Davila et al. 2003). However, lately companies from outside the blockchain sector launched ICOs, including established firms like Kodak and Telegram. Consequently, the sizes of funding rounds grew steadily over the last year. This indicates the potential of ICOs to disrupt traditional financing mechanisms in a wide range of industries.

An important reason why ICOs attract such massive amounts of funding is their astonishing return on investment both on short and long terms. Comparing to the generally good performance of most coins over the last year, there is an additional short term profit in the case of ICOs: Typically, the price at which investors buy coins during the ICO is substantially lower than the price of the same coins when they are traded on cryptocurrency exchanges days or weeks later. This phenomenon is referred to as underpricing and received considerable attention from research in the case of IPOs (Allen and Faulhaber 1989; Booth and Chua 1996; Loughran and Ritter 2004). There are numerous theories why it is in the interest of organizations to foster underpricing of their stocks in IPOs (e.g., exploit signaling effects to stress the company's quality, or increase the diversity of ownership). However, independent from the specific explication it holds that more organizational legitimacy leads to stronger underpricing (Lundmark et al. 2017). Legitimacy constitutes the perception of an entity's behavior to be socially desirable (Suchman 1995). In practice, legitimacy is not directly observable and therefore gauged with proxy measures (Zimmerman and Zeitz 2002). Numerous loci of legitimacy are identified in organizational literature in general (Aldrich and Fiol 1994) and for the specific case of capital raising (Pollock and Rindova 2003; Zuckerman 1999). The recent study of Lundmark et al. (2017) introduced social media as a source of organizational legitimacy. They show how the strategic use of Twitter by organizations can confer legitimacy, using underpricing in IPOs as a proxy measure. However, there is no other literature on the topic. Specifically, there are no studies on the conferral of legitimacy through other types of social media, namely those that are beyond the control of the organization accruing legitimacy itself, such as independent discussion forums. Furthermore, existing research focuses on established firms that can perform IPOs, while early stage ventures are neglected. Additionally, to the best of our knowledge, ICOs have been almost completely neglected by IS research so far. We argue, however, that especially IS-scientists with their work at the intersection between business, technology, and people (Hevner et al. 2004) can inform the entrepreneurial concerns regarding this blockchain-dependent funding mechanism. To address this three-fold literature gap, we formulate the following underlying research question:

RQ: *How does the use of social media relate to legitimacy and the extent of underpricing in ICOs?*

To address this, we explain the fundamental principles of ICOs and introduce them as an IT-based funding mechanism. We draw on theory of organizational legitimacy and apply it to the context of social media and ICOs. Besides Twitter, we include discussion forums out of the control of the legitimacy accruing entity in our investigation. We gather data of 95 ICOs and evaluate the impact and mediation effects of these social media on ICO underpricing. We find that discussion forum activity has a direct impact on underpricing and that the effect of microblogs on underpricing is mediated by this activity.

This paper makes several key contributions: First, we introduce ICOs as a funding mechanism in the field of Information Systems. To the best of our knowledge, this article is the first peer-reviewed work detailing the process, context, and implications of the ICO phenomenon. Second, the underlying mechanisms of underpricing as one of the crucial factors attracting investments in ICOs is explored and, based on IS literature on social media and studies on legitimacy, related to organizational legitimacy. As such, this is the first study that stresses the relevance of user-generated content (i.e., discussion forums) for organizational legitimacy and validates this claim with empirical results. Third, we prompt that different types of social media interact in their effects on organizational legitimacy and present empirical results to underpin this. Additionally, our study contains relevant implications for practitioners both in and beyond the blockchain industry.

The remainder of this paper is structured as follows. In Section 2, we introduce the foundations of ICOs, legitimacy and social media, and derive a number of hypotheses regarding the impact of social media on organizational legitimacy. In Section 3, we evaluate these hypotheses empirically by analyzing data of 95 ICOs. Section 4 provides a critical reflection of our results and research approach, while Section 5 concludes with the contributions and limitations of our study.

Conceptual and Theoretical Background

ICOs and Underpricing

In an ICO investors support a project with funding and receive newly generated project-specific coins in return. The main goal of projects launching an ICO is to secure funding while investors aim at owning a stake in such a project via the possession of the project-specific coins. Both the payment of capital by investors and the distribution of coins as a return occur automated through a blockchain. Typically, the entire ICO is conducted on one specific blockchain which serves as an ICO platform, for example the Ethereum blockchain. In this case, the project-specific coins are issued by a smart contract on the platform blockchain and are called tokens. Smart contracts are computer protocols, which automatically perform specific transactions without the involvement of a third-party after execution criteria have been met (Beck et al. 2017; Szabo 1997). Currently, Ethereum is by far the most commonly used platform for ICOs, although others are emerging (e.g., Neo or Qtum). The process of an ICO on such a platform is depicted in Figure 1. Before the launch of the ICO, the funds seeking project creates two smart contracts which define the key parameters of the ICO and the tokens to be distributed: For instance, the amount of money going to be accepted maximally (i.e., the *hard cap*), the time frame when the ICO will happen, the prize of the project-specific coins and how many of these coins will exist. After these smart contracts are deployed on the blockchain, investors can participate in the ICO by paying capital to the ICO Smart Contract. Notably, the capital is not paid directly to the project itself. After the payment of investors, the following part of the process is completely automated according to the pre-defined rules in the smart contracts. The project receives access to the capital paid into the ICO Smart Contract and investors receive their share of tokens from the Token Smart Contract. Thus, the core machinery of the ICO process – the exchange of capital for tokens – is a fully automated system running on a blockchain and can, as such, be viewed as an artifact of Information Technology (IT). In the future, as already existing distributed applications (DAppS) on blockchains, for example concerning identity verification, are maturing, it is probable that also peripheral processes of a funding, like "know-your-customer" (KYC) and "anti-money-laundering" (AML) verifications are possible to integrate in this automated processing of smart contracts.

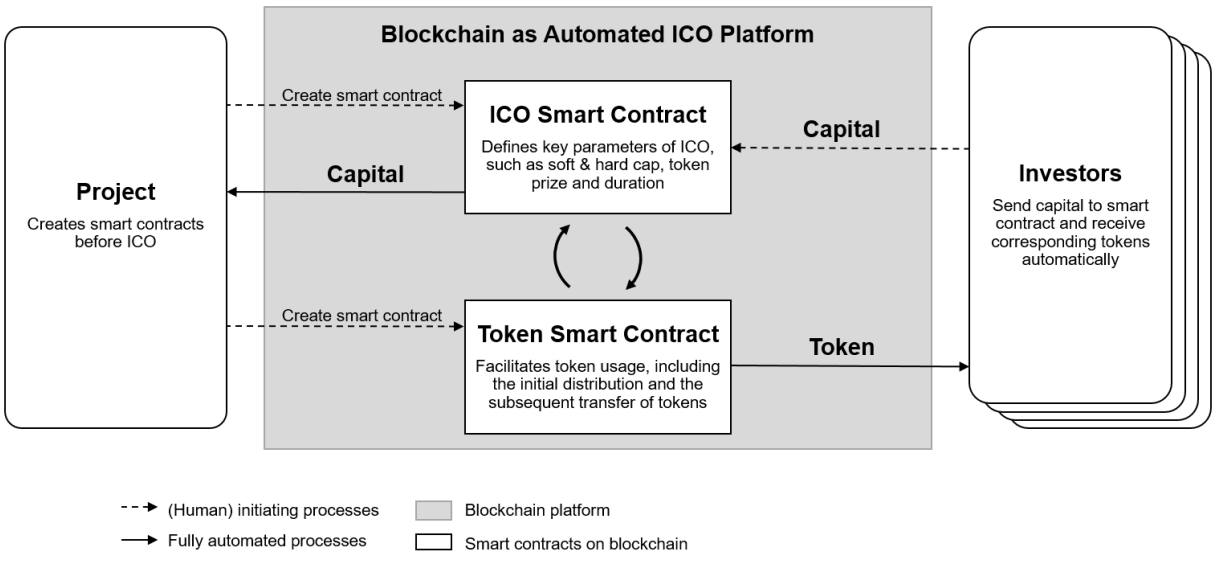


Figure 1. ICO Process

Besides these technical aspects, it becomes apparent that the application of this technology in the form of an ICO (i.e., a generally applicable funding mechanism) is of importance for human organizations and their management, as the funding of projects is one of the core tasks in the establishment of an enterprise. For these reasons, studying the phenomenon of ICOs meets the core interest of the IS discipline to advance knowledge about the use of IT in organizations and their management (Hevner et al. 2004).

In contrast to stocks in an IPO, the utility of the project-specific coins returned to investors can vary a lot and is defined individually for each ICO project. Commonly, the utility is distinguished into three core components: The ability (1) to transfer value, (2) to access a service, and (3) to receive a profit share of the project (FINMA 2018). Bitcoin, in its original sense of a currency, is a good example for (1): Possession of a Bitcoin essentially allows to easily transfer value worldwide over the Bitcoin blockchain. Ethereum and its coin Ether is a good example for (2): Ethereum provides infrastructure for a computer, the Ethereum Virtual Machine, which is accessible worldwide for anyone. In order to use this computer, for example to deploy smart contracts, a fee uniquely payable in Ether is due. Hence, only the possession of Ether allows access to the service provided by the Ethereum computer. Sharing profits of a project (3) is very similar to the payments of dividends in stocks and is implemented, for instance, by Modum or NEX. Individual coins of ICOs typically possess one or a combination of these three benefits, although many more can be linked to a coin at discretion, for example the ability to vote on important project decisions or the earning of more coins through provision of core infrastructure or supervisory services.

Coin utility	**Description**	**Examples**
Value transfer	Value can be transferred by exchanging coins with other people just like with traditional currencies	Bitcoin, Monero, Dash
Service access	A special service provided by the blockchain project, such as smart contract hosting or storage services, can only be accessed by paying a fee in the native coin	Ethereum, Filecoin, Gnosis
Profit share	Coin holders are entitled to receive a certain share of the profit the blockchain project generates	NEX, Modum

Table 1. Main coin utilities

Underpricing is the phenomenon often observed in IPOs that stocks issued by the company prior to the listing are sold at a lower price than they are later traded on the stock exchange after the listing. In the case of ICOs, we define underpricing as the difference between the issuance price of the coins in the ICO and the closing price after a workweek on at least one publicly accessible exchange. This is equivalent to the return for ICO investors, however we keep using the term underpricing, as it is established in the management and finance literature. This literature offers numerous explications why underpricing is often observed in IPOs. One line of argument is that underpricing is not desirable by the issuing company, because it can be interpreted that more money could have been raised issuing the same amount of stock at a higher price. In this case, underpricing is typically explained by misaligned incentives introduced by the underwriting third party investment bank, which suppresses the normal interplay of supply and demand in the setting of the offer price (Ritter and Welch 2002, p. 1803). However, other explanations indicate that underpricing is actually in the long term interests of the issuing company. According to Allen and Faulhaber (1989) signaling effects of underpricing are used deliberately by firms to underline their high quality and benefit from better conditions in subsequent financing rounds after a listing, ultimately maximizing their yield. Booth and Chua (1996) show that the issuer's preference for a broad ownership dispersion incentivizes underpricing. Aggarwal et al. (2002) claim that firms intentionally underprice to increase demand for the stock after the listing. Loughran and Ritter (2004) and Cliff and Denis (2004) demonstrate that underpricing is used by firms to compensate highly ranked analysts for their future coverage of the stock. In the case of ICOs the decision on the issuance price is essentially made by a small team of founders based on future expectations. They operate with a lot of freedom because ICO projects are typically very early stage and there is no operating performance to base the valuation on. As the capital market can be accessed directly over the blockchain, no underwriters are needed and the influence of third parties on the process is very limited. Additionally, the core team typically holds a major share of 10% to 30% of all project-specific coins and controls another substantial portion of coins as an endowment to the project, which can later be used as project funding. For all these reasons, we assume that underpricing in the case of ICOs will be in the long term interest of the issuing project. Therefore, and

in line with scholars investigating underpricing in IPOs, we argue that organizations which are viewed as more legitimate will yield a higher level of underpricing, as these audience perceptions will be reflected in the closing price after five days of trading (Lundmark et al. 2017). In the following, we will elaborate that the use of social media poses one of the few but effective means for ICO projects to establish and manage their legitimacy.

Legitimacy in ICOs

Suchman (1995) defines legitimacy in his seminal article as a "generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions" (p.574), adopting an inclusive and broad-based notion of the term. Notably, the conferral of legitimacy ultimately is a reaction of observers *perceiving* an organization and, hence, legitimacy can differ between viewers (Lamin and Zaheer 2012) and "is possessed objectively, yet created subjectively" (Suchman 1995, p. 574). Extant literature has identified a variety of potential loci of legitimacy, which Deephouse and Suchman summarize, in their review of the sources of legitimacy (2008, pp. 54–56), as society-at-large, interorganizational relations and the media. Evidence from journalism and mass communications strongly advocates that the media not only serve as a proxy measure but indeed confer legitimacy independently (Deephouse 1996). Extant research distinguishes between different types of legitimacy. Aldrich and Fiol (1994) distinguish between sociopolitical and cognitive legitimacy, where the latter simply reflects the public knowledge about a new venture and is especially important for entrepreneurs (Shepherd and Zacharakis 2003). Dacin et al. (2007) emphasize the difference between investment legitimacy, market legitimacy, relational legitimacy, and social legitimacy. Recently, in a first study Lundmark et al. (2017) investigated the impact that social media can have on the accrual and management of legitimacy. Their results indicate, using Twitter as the focal social medium, that organizations' activity on microblogs could actually confer legitimacy prior to the launch of IPOs.

The conferral of legitimacy has important consequences for organizations, as it can enhance survival prospects through better access to stakeholders and increased resource flow (Aldrich and Fiol 1994; Hampel and Tracey 2017). Legitimation protects a firm's perceived relevance by justifying to a peer or super ordinate system its right to exist (Dowling and Pfeffer 1975). Under conditions of uncertainty and complexity, accruing and managing legitimacy is of particular relevance (Kostova and Zaheer 1999). Investing in early-stage companies with often unproven technologies, as it is typically the case with ICOs, carries inherent risk and uncertainty. Hence, it seems reasonable to assume that the perceived degree of organizational legitimacy from investors plays a vital role in the price developments of any ICO. Although there is no literature on legitimacy and ICOs, there exist some studies on legitimacy in traditional capital markets. Scholars have highlighted the importance of external authorities such as security analysts (Zuckerman 1999), reputed underwriters or renowned media (Pollock and Rindova 2003). While this is probably also true to a certain extent in the case of ICOs, contrary to more mature capital markets, the ecosystem of potential external authorities is very limited. There is not a whole industry of professional analysts, underwriters or professional media outlets that observers could refer to for their perception of legitimacy. However, there is very high activity of all stakeholders involved (i.e., project initiators, investors, influencers, developers, etc.) on social media, which were also identified as an origin of legitimacy by Lundmark et al. (2017). Besides this study, information on legitimacy effects of social media in IPOs is virtually absent, although there are studies on price predictions with social media data in stock markets (Oh and Sheng 2011) and the Bitcoin market (Mai et al. 2018). We aim to supplement to the knowledge on how social media serves as a mechanism for conferring legitimacy in two ways. First, we include social media data of individual user-generated content (UGC) in our study, specifically from the online discussion forums Bitcointalk and Reddit. This is supplementary to existing research which includes only marketer-generated content (MGC), namely tweets of the same companies whose legitimation is investigated. Second, we focus on legitimacy effects in the context of rather small and new companies that launch ICOs, in contrast to existing research which focuses on organizational legitimacy of established enterprises that launch an IPO.

Social Media Driving Legitimacy in ICOs

Kaplan and Haenlein (2010) define social media as "a group of internet-based applications that build on the ideological and technical foundations of Web 2.0 and that allow the creation and exchange of UGC" (p.

61). Current examples of social media applications include microblogging sites like Twitter, social or professional networking sites like Facebook and LinkedIn, discussion forums like Reddit and many more. Social media allows firms to communicate directly to large audience groups like customers or small-scale investors and to interact with this audience in a swift way. The information exchanged over social media can vary extensively between firms regarding the topic focus and the level of details provided. Firms launching an IPO use these channels mainly to confer cognitive legitimacy and raise awareness, for example by referral to articles of authorities discussing the launch of the IPO (Lundmark et al. 2017). In the case of ICOs, however, the social medium Twitter is often the main, and in the beginning the only, public communication channel of the project besides their website. Therefore, sometimes also vital information is announced via Twitter, for example the launch of an ICO, the start of trading of a coin on an exchange or the publishing of a whitepaper providing project details. This further increases the importance of and the dependency of investors on tweets in the ICO realm, compared to IPOs. For example, Nebulas announced a change of price terms on Twitter *during* the ICO, with retrospective effect: "New Pricing Rules for NAS Pre-Sale Early Bird Participants! Nebulas will make settlements with all the early bird pre-sale participants according to the highest ETH price at 6:00am EST during the early bird period. https://t.co/H8KMG1PiEc", and Iota announced the trading launch of their coin: "IOTA Exchange Launch https://t.co/fgVANntbV6 #iota #tangle #blockchain #exchanges".

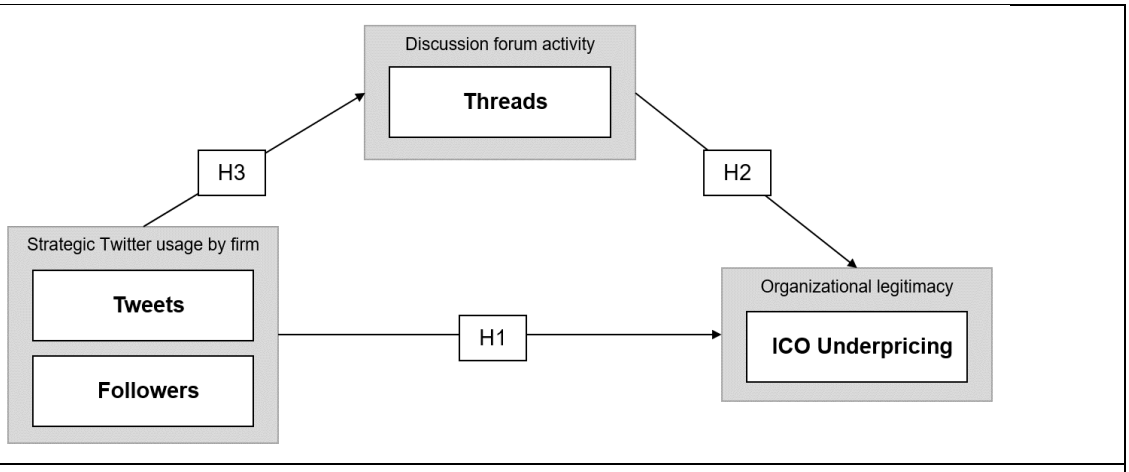


Figure 2. Research Model for Social Media Effects on Organizational Legitimacy

In this paper, we elaborate how social media can increase organizational legitimacy by opening a direct information channel to individual investors. An overview of our research model is shown in Figure 2. As legitimacy is not directly observable (Zimmerman and Zeitz 2002), we follow the approach of Lundmark et al. (2017) and use underpricing as our dependent variable, serving as a proxy for organizational legitimacy. We use Twitter as a focal medium because of its importance in the ICO community, as discussed above, and existing studies indicating that, specifically, Twitter can confer legitimacy in the context of traditional capital markets (Lundmark et al. 2017). If it is possible to confer legitimacy via Twitter we expect that a more intense usage of the medium increases this effect (Miller and Tucker 2013; Risius and Beck 2015). As legitimacy is a perception, the conferral of legitimacy should also increase with the size of the audience (Clark and Melancon 2013; Miller and Tucker 2013). This leads to two predictions about the mechanisms that confer legitimacy and, ultimately, may increase the level of underpricing observed in an ICO.

***Hypothesis 1a**: The higher the activity of a firm on social media prior to their ICO, the higher the level of underpricing.*

***Hypothesis 1b:** The higher the reach of a firm on social media prior to their ICO, the higher the level of underpricing.*

Companies use microblogs, such as Twitter, as a means to disseminate information directly to their follower network, whether this be potential investors, consumers, partners, or society-at-large. This is primarily a one-directional communication system that effectively spreads MGC to a targeted audience. The crypto environment has, however, formed online communities where communication can flow multi-

directional, for example in public online discussion forums such as Reddit and Bitcointalk. On these platforms, millions of users are discussing different facets of the cryptocurrency industry, hence creating UGC on these networks. Pollock and Rindova (2003) provided "preliminary evidence about the difference between the impact of firm-provided and media-provided information in the IPO market", stating that "it is media-provided, rather than company-provided, information that has the credibility and/or reach necessary to influence investor behavior systematically" (p. 640). Antweiler and Frank (2004) were the first ones to demonstrate the general impact of UGC on stock price movements. Meanwhile, Goh et al. (2013) highlighted that UGC drives sales immediately while effects of company generated content depend on the addressed audience, and Mai et al. (2018) specify in the context of cryptocurrency values that messages on an Internet forum have a stronger impact compared to tweets. Given these findings, we expect that the discussion on such online forums could develop a decisive impact on the legitimacy of an ICO project. Including UGC in the study of social media and legitimacy might offer a novel understanding of how social media can drive legitimacy. So far, to the best of our knowledge, studies regarding the effects of discussion forums on organizational legitimacy have been virtually absent. Additionally, although numerous studies have found systematic relationships between microblogging and the stock market (Oh and Sheng 2011), the documented effects from discussion forum activity is weak (Antweiler and Frank 2004; Das and Chen 2007; Tumarkin and Whitelaw 2001). As the cryptocurrency market, and hence the investor community, is inherently digital, the digital activity from the audience might provide a previously unavailable opportunity to discover the legitimation effect of discussion forums in capital markets. This leads to an additional prediction about the mechanisms that confer legitimacy and, ultimately, may increase the level of underpricing observed in an ICO.

Hypothesis 2: *The higher the amount of UGC on discussion forums mentioning a company before its ICO, the higher the level of underpricing.*

In an early phase of the existence of a company, as it is the case previous to an ICO, participants on such discussion forums rely to a big part on the publication of information by the company itself, which can then be discussed among the forum members. As such, we expect that a more active communication on Twitter as well as an increase in people receiving this communication has a positive effect on the activity on such discussion forums. This leads to two predictions about mechanisms that increase discussion forum activity and, possibly, may increase the level of underpricing observed in an ICO in a mediated indirect way.

Hypothesis 3a: *The higher the activity of a firm on social media prior to their ICO, the higher the amount of UGC on discussion forums.*

Hypothesis 3b: *The higher the reach of a firm on social media prior to their ICO, the higher the amount of UGC on discussion forums.*

Referring, again, to the findings that communication from other parties than the firm under investigation develops stronger influence (Goh et al. 2013; Pollock and Rindova 2003), and that the use of Twitter may increase discussion activity (Dunlap and Lowenthal 2009), and considering the previous hypotheses, we expect that the influence of Twitter is actually mediated by discussion forum activity. This leads to the final two predictions about the mechanisms that confer legitimacy and, ultimately, may increase the level of underpricing observed in an ICO.

Hypothesis 4a: *The effect of a firm's activity on social media prior to their ICO on ICO underpricing is mediated by the amount of UGC on discussion forums.*

Hypothesis 4b: *The effect of a firm's reach on social media prior to their ICO on ICO underpricing is mediated by the amount of UGC on discussion forums.*

In this study, we operationalize the hypotheses formulated above using the number of tweets as a measure of social media activity, the number of followers on Twitter as a measure of reach and the number of threads on selected subreddits as a measure for the amount of UGC on discussion forums.

Empirical Study

To investigate these hypotheses regarding the effects of social media-dependent organizational legitimacy on the genesis of ICO underpricing, we collected a comprehensive sample of ICO prices and related social media communication.

Sample and Data Analysis

The ICO sample was drawn from the independent ICO database ICODrops on March 8th 2018. To guarantee economic feasibility of the manual data collection, a random sample of 212 ICOs was drawn from the overall sample of 340 successfully completed ICOs since the database's start in May 2017. Of these, 72 did not have registered trading data for the five days necessary to calculate underpricing, mostly because they were not yet listed on an exchange. Another 12 ICOs were removed from the sample because other necessary data to perform the analyses, such as twitter or discussion forum information, was not available. To ensure a minimal quality of the unregulated ICOs we removed all that raised less than $1M (i.e., two) and those that achieved less than 50% of their funding target (i.e., 31). This resulted in a final sample of 95 ICOs.

For all the 95 ICOs we collected data from several websites: For price information of the coins we used Coinmarketcap (coinmarketcap.com). The tweets were manually gathered directly from the official accounts of the ICOs on Twitter (twitter.com), totaling to 4,188 unique tweets. The number of followers was derived from snapshots of the Twitter page of projects registered by the Internet Archive (web.archive.org). The discussion forum activity was retrieved from Bitcointalk (bitcointalk.org) and selected subreddits on Reddit (reddit.com). In total, we crawled 33,784 mentions in threads. Data concerning the control variables was gathered from ICODrops (icodrops.com), project webpages, whitepapers and LinkedIn.

To test the proposed hypotheses, we conducted a number of OLS regressions. Multicollinearity was assessed by examining the variance inflation factors. With VIF scores around one, there was no indication of multicollinearity among the independent and control variables. Next, the leverage and influence of outliers were assessed through the Cook's distance. Filecoin's ICO is the observation with the most leverage and influence, raising $257M during the ICO. As such outliers are considered relevant, no further sample treatment was conducted. Furthermore, normality and linearity were assessed through visual inspection of a normality and residual Q-Q plot. Although White's test showed no significance for heteroscedasticity, Heteroscedasticity-consistent standard errors (HC1) are applied as a conservative measure in order to ensure consistent estimates of standard errors (Long and Ervin 2000).

To test for mediation effects, we performed a formalized test, namely *confidence interval bootstrapping*, to measure whether the mediation effect is statistically significant (Hayes 2017). The test is run on a macro developed for SPSS by Preacher and Hayes (2004). 5,000 bootstrap samples were made, and the same control variables and robust standard errors were applied to test all hypotheses.

Measures

Dependent variable

Underpricing is the dependent variable and serves as a proxy for organizational legitimacy. In this, we follow the approach of Lundmark et al. (2017), because legitimacy is impossible to observe directly (Zimmerman and Zeitz 2002). ICO underpricing is understood as the difference between the issuance price of the coins in the ICO and the closing price after a workweek of trading on at least one publicly accessible exchange. We chose five days because of the extreme volatility of ICOs often observed within the first days after a coin is listed. This is typical for an initial phase of trading, which is dominated by uncertainty about the market value of a company. However, in contrast to IPOs, several additional factors increase the high volatility in the case of ICOs: Exchanges often cannot handle the high traffic in the initial phase of a coin listing, essentially shutting down for some of the users, preventing them from reacting to price changes and adjusting orders. Additionally, the exact start of trading is typically not announced to the public in advance. Together with the fact that coins often can only be transferred to an exchange after trading has started and it takes time for investors to move their coins with blockchain transactions, the

volume at trading start can be very low. The issuance price is the price investors pay for the coins when participating in the ICO. Prices were determined in the denomination Ether, as the reference currency for ICO investments, for two reasons. First, the great majority of recent ICOs launch on the Ethereum network and, second, Ether is the common currency that an ICO accepts as payment. Accordingly, we calculate underpricing for ICOs as the following percent change: (5^{th} day closing price – ICO issue price) / (ICO issue price) x 100.

Independent variables

To address hypotheses 1a-3b, we followed the classical mediator analysis approach (Baron and Kenny 1986) by testing the following sets of models. Models 1 and 2 test the effect of strategic Twitter management and discussion forum activity on ICO underpricing (i.e., *Tweets, Followers* and *Threads*). Model 3 tests the effect of strategic Twitter management on discussion forum activity as the dependent variable.

Tweets represents the total number of tweets (including re-tweets, i.e. sharing, or "re-tweeting" someone else's Tweet) posted 30 days before the ICO date. This 30-day interval does not include the ICO date itself in order to avoid any biases, such as reverse causality. The data is gathered by going through a firm's Twitter feed, subsequently counting the total number of tweets posted in the 30-day time interval before the ICO.

Followers represents the total number of followers on the Twitter account of a given organization the day before the ICO, measured in thousands of followers. Hoffman and Fodor (2010) consider this variable a measure of popularity given that people follow the organization to obtain information for investing decisions. As historical data on the number of followers of an account is not available directly on twitter we approximate the total number of followers using the Internet Archive (web.archive.org) which provides past snapshots of companies' Twitter pages. If no snapshot was provided for the day before the ICO, we conducted a linear approximation in relation to the deviating days from the ICO date, and the creation of the Twitter account. Snapshots taken before the ICO date were preferred over snapshots taken shortly after the ICO date in order to minimize potential biases in the data, such as reverse causality. This resulted in a median deviation of 16 days which we consider satisfactory.

Threads represents the (logarithmic) total number of threads that a firm was mentioned on selected online discussion forums in the 30-day interval prior to its ICO date. Cha et al. (2007) suggests that mentioning infers acknowledgement, addressivity and attribution. Since actively mentioning a certain company on discussion forums requires cognitive effort, a company that is mentioned frequently might be associated with stronger influence. A multitude of online discussion forums exist on cryptocurrency topics and the largest communities are Bitcointalk and Reddit. With millions of users, these two forums arguably serve as a satisfactory proxy for online discussion forum activity on cryptocurrencies. Bitcointalk is a forum solely for the purpose of discussing cryptocurrency topics, hence the forum as a whole was included in the search. However, Reddit is a general forum with no restrictions in terms of discussion content. Hence, only a subset of Reddit forums, called subreddits, were included in the search, according to the three following conditions. First, the forum should have a considerable number of subscribers, such that posts are likely to play a part in the legitimation process. Specifically, we defined a minimal number of subscribers of 100,000. Second, a relevant number of discussions about ICOs should exist on the given subreddit. Third, the subreddit should evolve around a topic related to the cryptocurrency environment. This ensures that posts are seen by users within the target group of potential investors. This resulted in the inclusion of 5 subbreddits. We then searched the according forums with Google and used Google syntax to limit the search results to the given online domains and the correct time interval. We searched for either the name of the project or its trading ticker symbol.

Control variables

To respect potentially confounding effects beyond those hypothesized above, eight control variables are incorporated in our models. Following the approach of renowned scholars investigating IPO underpricing (e.g., Pollock and Rindova 2003), we control for essential loci of legitimacy in the context of investments, specifically quality indicators of the individual projects and case-specific variations of the ICO process (Ibbotson and Ritter 1995), as well as more general influences like the accompanying media coverage.

Variable	Mean	Median	Min	Max	Std
ICO Underpricing	110.97	42.54	-73.23	1730.78	245.28
Tweets	44.08	33.00	0.00	235.00	42.64
Followers	6.89	4.88	0.00	46.22	7.14
Threads	5.36	5.46	2.08	8.31	1.04
Crypto news	3.25	2.00	0.00	20.00	4.21
Firm age	16.51	11.00	0.00	107.00	15.56
Raised funds	92.12	51.78	1.91	1154.63	154.03
Oversubscribed	0.79	1.00	0.00	1.00	0.41
ICO duration	14.11	7.00	1.00	84.00	16.20
Valuation	267.23	118.31	4.76	8667.79	893.53
Min cap	0.14	0.00	0.00	2.00	0.38
Max cap	0.14	0.00	0.00	1.00	0.35

Table 2. Descriptive statistics for complete sample

Crypto news represents the total number of unique articles a project is mentioned in on cryptocurrency news webpages 30 days before its ICO date. Previous research showed clear effects of media-provided content on organizational legitimacy (Pollock and Rindova 2003). The set of news webpages was found by incrementally adding search terms related to cryptocurrency news in Google's "News" tab (e.g., "Crypto news", "ICO news", etc.), until further searches did not add any more additional news sites. The resulting 50 websites were examined to filter out websites that do not frequently publish cryptocurrency-related content. Out of the 18 relevant news pages, Similarweb (similarweb.com) was used to exclude webpages with less than 1 million visits per month. The remaining 9 websites were included in a Google search in a similar fashion to *threads*, limiting the search to the relevant web domains and time span. We did not include any traditional media because they provide almost no information on projects before the ICO. Specifically, a Factiva search of all the mainstream news sites with over 100 million monthly visits (i.e., Business Insider, Forbes and Bloomberg) revealed only six articles on our full sample of 95 ICOs. ***Firm age*** represents a company's age in months, measured as the date of foundation subtracted from the ICO date. Firm age might affect underpricing as older companies have had more time to develop legitimacy, both actively and passively (Lundmark et al. 2017). Hence, it is expected that, for instance, a three-year-old company presents itself more credibly and legitimately in the ICO process compared to a company that was founded only three months before. ***Raised funds*** describes the total amount raised during the ICO, measured in thousands of Ether. It is reasonable to expect that a company's ICO that raised substantially more than its peers did, received more attention and is considered more "desirable and proper". ***Valuation*** represents the implied valuation of the focal company, calculated as the amount of funds raised divided by the share of coins for sale. Similar to *Raised funds*, this variable is measured in thousands of Ether. Applying the same reasoning as above, a company with a higher valuation might be perceived more "desirable" than its peers, and might therefore confer more legitimacy in the cryptocurrency community. ***Oversubscribed*** is a dummy variable describing whether the ICO reached the maximum cap, which is given the value 1 if this is the case. When a company needs to stop the ICO before the pre-announced end date because the maximum cap is reached the ICO generated excess demand. If the investors active in ICOs are also active on exchanges the coin is listed on, it is reasonable to assume that the excess demand will manifest itself in increased underpricing once the coin starts trading. Furthermore, the very fact that a ICO was oversubscribed can spark interest with investors in general, because it is clear that the coins are "desirable", which is a strong signal of legitimacy. ***ICO duration*** represents the total amount of days the ICO lasted. A long ICO duration can signal that the demand is relatively lower for a given coin, meaning it is perceived as less desirable by the market. Conversely, ICOs ending within the first day often generate attention and might be perceived as more legitimate. Hence, it is expected that increasing ICO duration has a negative impact on ICO underpricing. ***Min cap*** represents the minimum investment required by investors to participate in the ICO, measured in Ether. If the minimum limits are substantial, it is reasonable to assume that certain investors are excluded from the ICO. If this is the case for interested investors, there exists excess demand for the coin that might result in higher underpricing once the coin starts trading on exchanges. ***Max cap*** is a dummy variable that gives

the value 1 if the company has set an upper investment limit in their ICO. Several factors indicate that setting a maximum investment might increase underpricing. In case some investors were prohibited from investing the entire amount they wished, excess demand is created that might result in higher underpricing. Furthermore, a maximum cap might lead to a more fragmented pool of coin holders. As the value of a coin is likely to increase as a function of how many coin holders exists, a successful ICO with a maximum cap might be perceived as more desirable. Hence, it is expected that the maximum cap might increase the underpricing.

Results

The results of the regression models addressing hypotheses 1-3 are summarized in Table 3. In addition, the results of the confidence interval bootstrapping are displayed in Table 4.

Dependent variable	**ICO Underpricing**		**Threads**
Variable	**Model 1**	**Model 2**	**Model 3**
Tweets	0.0195 (0.4265)		-0.0011 (0.0023)
Followers	6.4155 (4.0839)		0.0263 (0.0120) **
Threads		57.1669 (20.3703) ***	
Crypto news	-3.8299 (5.3352)	-5.8737 (4.5823)	0.033 (0.0221)
Firm age	-2.0819 (1.3219)	-1.7610 (1. 1664)	-0.0055 (0.0061)
Raised funds	-0.1689 (0.2198)	-0.1098 (0.1879)	0.0005 (0.0006)
Oversubscribed	89.6081 (39.3218) **	33.5220 (36.0724)	1.0000 (0.3244) ***
ICO duration	0.1829 (1.5639)	-1.0023 (1.5936)	0.0167 (0.0087) *
Valuation	0.0156 (0.0195)	0.0139 (0.0189)	-0.0000 (0.0000)
Min cap	180.159 (174.292)	181.857 (183.787)	-0.0340 (0.1354)
Max cap	104.19 (70.1130)	84.1594 (73.4662)	0.4209 (0.2351) *
Intercept	12.0124 (74.5026)	-189.573 (88.0862) **	4.1013 (0.3916) ***
N	95	95	95
F	2.25	2.59	3.12
Adjusted R^2	0.1490	0.1783	0.1048

Unstandardized coefficients are reported. Robust standard errors (HC1) in parenthesis.
* p<0.1, ** p<0.05, *** p<0.01

Table 3. OLS robust regressions

Model 1 tests hypothesis 1, i.e. whether strategic Twitter management is systematically associated with ICO underpricing. However, it does not show support for these hypotheses. Model 2 addresses hypothesis 2 that higher discussion forum activity is related to higher ICO underpricing. It provides support for this hypothesis. *Threads* is significant at a 1% level, indicating that more discussion forum activity increases a firm's legitimacy, ultimately driving up ICO performance. Note that the variable is logarithmically transformed, implying that the marginal value of additional discussion forum activity is positive, but decreasing. Hence, while being mentioned on discussion forums might drive legitimacy, this effect decreases with more online attention. Examining hypothesis 3, Model 3 provides the regression that answers our hypotheses regarding the relationship between internal and external social media mechanisms. Hypothesis 3a suggests the more tweets a firm posts prior to its ICO, the more the firm will be mentioned on discussion forums. However, Model 3 does not offer any support for this hypothesis. Hence, it does not seem like Twitter activity in itself is sufficient to spark online dialogue on discussion forums. Conversely, Model 3 shows that the total number of Twitter followers of a company is indeed systematically associated with more online discussion forum activity. Hence hypothesis 3b is supported, concluding that companies with a large follower base on Twitter do receive more exposure on online discussion forums.

Independent variable: Followers[a]	Total effect	Direct effect	Indirect effect
Effect	6.4155	5.0850	1.3306
Standard error (HC1)	4.0839	4.2661	-
Bootstrap standard error	-	-	0.9413
T-statistic	1.5709	1.1919	-
p-value	0.1200	0.2367	-
Lower level confidence interval	-0.3768	-2.0114	0.0804
Upper level confidence interval	12.2078	12.1813	3.0101
[a] Number of bootstrap samples for percentile bootstrap confidence intervals: 5,000			

Table 4. Confidence interval bootstrapping

To test hypothesis 4, we consider if discussion forum activity has a mediating effect on the relationship between strategic Twitter management and ICO underpricing. Indeed, although there was seemingly no direct effect between the two, the presumed effect might work through discussion forum activity. In the formal mediation test, *Followers* is selected as the independent variable as it was the only variable that predicted discussion forum activity. Is it so that having a large follower base has an indirect effect on ICO underpricing through discussion forum activity? The output from SPSS is summarized in Table 4. As shown previously, the total effect of the number of Twitter followers is not statistically associated with ICO underpricing, confirmed with a p-value of 12%. We also indicate that the significance strongly weakens when the mediator is introduced, showed under the 'Direct effect' column in Table 4. The bootstrapping macro produced a 90% confidence interval based on the sorted values of the estimated indirect effects (i.e., the difference between the total and direct effect). Based on the values of the confidence interval, it can be concluded that the indirect effect is statistically different from 0. Hence, hypothesis 4b is supported. The legitimacy of a large follower base influences online attention and activity, which again confers legitimacy in the blockchain community, ultimately measured through ICO underpricing. The summarized results are visualized in Figure 3.

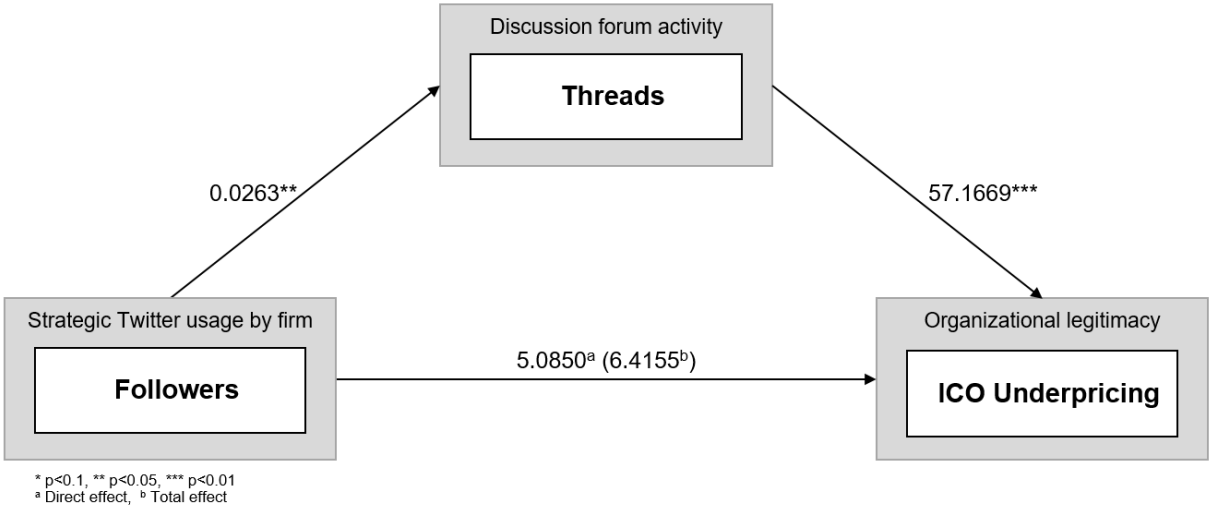


Figure 3. Summary of findings

Discussion

The results of our investigation reveal four key findings regarding ICO underpricing through social media enabled organizational legitimacy. Our first hypothesis that the strategic use of Twitter (i.e., tweets and followers) increases underpricing in ICOs directly is not supported. This is in contrast to previous findings that show a significant correlation between these measures and underpricing in the case of IPOs

(Lundmark et al. 2017). Possible explanations for our result include that the mechanisms conferring legitimacy in the context of ICOs and recently established ventures might differ more than expected from the setting of established companies and IPOs. However, a close consideration of social media related research shows that effects of company generated messages depend on the communication style. Namely, marketer generated messages only drive company performance when specifically addressing individual users (Goh et al. 2013). Thus, company messages have been found to be fully mediated through the appealed users.

In line with this argumentation, we find a highly significant correlation between the activity on public discussion forums (i.e., threads) and ICO underpricing, confirming our second hypothesis. This suggests that social media confers legitimacy through the provision of content by third parties in an environment not directly controlled by the legitimacy-accruing entity. This relates to earlier key IS contributions that UGC has more impact on increasing purchases than MGC (Goh et al. 2013) and that forum contributions are more influential than tweets in driving the price of Bitcoin (Mai et al. 2018). Additionally, this result can be viewed in perspective of the key contribution of Pollock and Rindova (2003) on organizational legitimacy, which found that media-provided content is more important than firm-provided information in influencing investor behavior. The fact that the control variable "crypto news" is not significant in any of our models, prompts us to speculate that social media actually replaces, to a certain extent, the influence of traditional media in the context of ICOs. We further elaborate on this interpretation below.

The third hypothesis, that the usage of Twitter (i.e., tweets and followers) influences the activity on discussion forums, is partially supported by our results. Specifically, we find a systematic correlation between followers and threads (i.e., hypothesis 3b), but no significance for the number of tweets (i.e., hypothesis 3a). Thus, we note that the reach of the company providing information is important, whereas the frequency of these updates alone seem to have no significant effect on the activity on discussion forums. Hence, we conclude that the strategic use of twitter may influence the activity on discussion forums. This is a further indication that the mediation effect of hypothesis 4 might be valid.

Hypothesis 4 regarding the mediation effect is indeed supported by our analysis. This indicates that it is actually rather the activity on discussion forums than the usage of Twitter by the projects which confers legitimacy. Additionally, it suggests the possibility that the activity on discussion forums, and with it the legitimacy of an organization, could be influenced through strategic Twitter management by that same organization. We stress that our formal analysis itself conveys no justification regarding the causality of the effects observed. However, our argumentation leading to the hypothesis 4 delivers several explications that make a causal relationship plausible. Additionally, Dunlap and Lowenthal (2009) also suggest that Twitter use may increase discussion activity. This would, in turn, mean that organizations can actually use Twitter strategically for establishing legitimacy by influencing the behavior of the crowd on a multitude of social media and, hence, have major implications.

We highlight two additional observations regarding the control variables. First, "oversubscribed" is significant in model 1 and 3, however, not in model 2. The significance is very intuitive, as a good (i.e., in our case project-specific coins representing a stake in the project) for which more demand than supply exists is clearly "desirable" in the sense of organizational legitimacy. However, "oversubscribed" is not of much informational value in practice, as it is only available after the ICO has finished. Additionally, it is typically not possible to measure the magnitude of oversubscription in an ICO because of its fully automatic nature. No formal offerings need to be made before the ICO as the payment to the ICO smart contract itself directly leads to the successful participation in the ICO without any prior action of the investor, contrarily to IPOs. Interestingly, the significance of "oversubscribed" vanishes when the effect of discussion forums is introduced in model 2. This suggests that the activity on discussion forums *before* the ICO is a more accurate predictor for the extent of underpricing than the information if the ICO was oversubscribed.

Second, the variable "crypto news" is not significant in any of the models. This is unexpected, as previous research on organizational legitimacy in the market of IPOs shows clear effects of media-provided content (Pollock and Rindova 2003). The variable "crypto news" represents the number of articles published regarding an ICO before its launch on specialized news sites covering cryptocurrency topics. Mainstream media, such as Forbes or Bloomberg, were excluded because they provide almost no such articles. We speculated above, that in the market of ICOs social media, and especially UGC on discussion forums, might have replaced this influence of traditional media-provided content. On the one hand, our

assumption might be valid only temporarily, as long as mainstream media keep providing almost no coverage of projects prior to their ICO. On the other hand, it might be a more fundamental change, that in the inherently digital and decentralized space of cryptocurrencies and ICOs, individual users and their contributions on key forums develop more influence than centrally curated articles of traditionally organized publishers. This view is supported by the fact that there are already established news sites specialized on cryptocurrency topics, which do include information about projects before the launch of their ICO and are, in this study, integrated into the control variable "crypto news", which never reaches significance. However, the non-significance of this control variable should not be over-interpreted, as it was not specifically designed to test the influence of media-provided content in our research setup but rather to control for its effects.

Conclusion

This study set out to address how the use of social media relates to organizational legitimacy, which is not directly observable in practice, by investigating the effects on ICO underpricing. This is motivated by a three-fold literature gap. First, social media have previously been introduced as a source of legitimacy before (Lundmark et al. 2017), however, there is a lack of information on the influence of *different types of social media* on organizational legitimacy, especially those that are beyond the control of the legitimacy-accruing entity. Second, extant research focuses on the influence of social media on the legitimacy of established organizations that are mature enough to conduct an IPO, while research considering *young ventures* is lacking. Third, research considering the *phenomenon ICO*, and consequently also the important enquiry of the mechanisms related to organizational legitimacy in this context, is virtually absent in IS research, although it is a key IS concern. As such, the main goal of this study is to further the understanding of how social media affects organizational legitimacy, especially in the unexplored context of young ventures in the context of ICOs. Additionally, we introduce the important phenomenon of ICOs as an IT-based funding mechanism in the IS community and motivate further research on this topic.

Theoretical and Practical Implications

To the best of our knowledge, this study is the first to investigate the effects of a variety of social media and their interactions on the organizational legitimacy of rather new ventures in the context of ICOs. Our study provides a number of theoretical contributions that are empirically validated. First, based on extant IS-research on social media and studies on organizational legitimacy, we derive possible legitimation effects of user-driven social media, namely discussion forums, which are supported by the results of our empirical study. As such, this is the first study that stresses the importance of UGC on organizational legitimacy and substantiates this claim with empirical results. Second, we pose that different types of social media interact in their effects on organizational legitimacy. Namely we find that strategic Twitter management by the legitimacy-accruing entity is mediated in its effects on organizational legitimacy by the activity on discussion forums. Contrary to previous studies, we cannot confirm direct legitimacy effects of strategic Twitter management. Third, we are the first to investigate legitimacy effects of social media on young ventures as opposed to extant research on bigger corporations. We lay out the special importance of social media in this context and provide results that point towards the parallel decrease of importance of traditional media and, as such, a potential shift in loci of legitimacy in the context of new ventures and ICOs.

This study also has important contributions to IS research. Various effects of social media have been an important and ongoing topic in IS (Dewan and Ramaprasad 2014; Ge et al. 2017; Mai et al. 2018; Oh et al. 2013; Qiu et al. 2015; Schlagwein and Hu 2017; Scott and Orlikowski 2014). We apply key findings of the IS community on social media to the context of organizational legitimacy and confirm the validity of these findings in the new context. We expand the previous investigations of Lundmark et al. (2017) on legitimacy effects of social media in three ways. We include additional types of social media in our study, namely UGC generating discussion forums, observe the effects on new ventures, as opposed to more mature ones, and focus on the special context of ICOs. In addition to the insights on the legitimacy effects of social media, we are the first to introduce the fundamentals of the important phenomenon ICO as an IT-based funding mechanism to IS research. We position ICOs at the core interest of the IS community as

a highly automated funding mechanism based on a single IT artifact with important consequences for humans, organizations and their management.

Lastly, this study also contains important implications for practice. By showing that social media-induced legitimacy can affect a project's financial performance by inspiring cross-platform discussions, we inform management launching an ICO on important engagement areas. These insights could also inform other industries, indicating that the level of discussion activity is an important performance metric for the social media channels of organizations and, as such, could contribute to the ongoing discussion about measuring the return of social media marketing (Hoffman and Fodor 2010). Our study also provides data that could enable investors to estimate the level of underpricing of an ICO in advance and help to assess risk factors. Our findings show that it is important for prospects to consider the forum discussion activity for assessing the ICOs legitimacy as part of their due diligence before making investment decisions.

Limitations and Future Research

While our study is a first approach to investigate the effects of a variety of social media and their interactions on organizational legitimacy, there are some important concerns to our research. First, our sampling procedure was limited to a specific set of social media, namely Twitter as a means to broadcast news by the organization, as well as Reddit and Bitcointalk as discussion forums. While these are the most prolific ICO related social media platforms, investigating additional social media sources might produce different results. However, as our hypotheses were derived from general research insights on social media and we chose the most prevalent broadcasting channel with Twitter and only the most active discussion forums for our data collection, we strongly believe that our results are reasonably robust and generalizable. Still, investigating additional social media (e.g., Telegram or Medium), especially those that enable interaction between independent users and the legitimacy accruing entity, might be an interesting avenue for future research. Second, our study merely considered the bare number of tweets and forum posts and no other features such as the nature of their content or user reactions (e.g., retweets or replies to forum posts). Exploring the specific content of these messages might lead to further insightful discoveries. We intend to apply text mining techniques, such as sentiment analysis and latent dirichlet allocation, to substantiate our understanding regarding the specific effects of different forum discussions and company communication. Third, our study deliberately limits the loci of legitimacy to the realm of social media. The influences of other legitimacy sources like traditional media or third party authorities are only briefly touched upon. Additionally, organizational legitimacy is not directly observable (Zimmerman and Zeitz 2002) and underpricing can only assist as a proxy for legitimacy, although a very established one. It would be interesting to further investigate the influence of other sources of legitimacy in the context of ICOs and especially compare their competing relevance to that of social media, potentially using other proxies. Fourth, additional control variables (e.g., circulating supply or additional media outlets) might be able to further explain some of the underpricing effects observed in our study. Considering the recent rise in popularity of ICO vesting schemes and, thus, limited circulating supplies, the relevance of this variable is particularly rising. An additional limitation is the sample size of 95 ICOs. Although this represented a considerable amount of all ICOs ever performed at the time of data collection, in a future study more ICOs could be included in the sample, as more ICOs finish every month and the potential sample size is growing quickly. This would also allow to integrate additional control variables without compromising generalizability and to verify the conclusions of our study. Lastly, it needs to be stressed that our empirical findings are correlative in nature. While the referenced legitimacy theory substantiates the assumed effective direction, the empirical analysis only demonstrates the association of these constructs. Thus, as often called for but seldom realized (Aral et al. 2013), experiments are needed to ultimately confirm causality.

References

Aggarwal, R. K., Krigman, L., and Womack, K. L. 2002. "Strategic IPO Underpricing, Information Momentum, and Lockup Expiration Selling," *Journal of Financial Economics* (66:1), pp. 105–137.

Aldrich, H. E., and Fiol, C. M. 1994. "Fools Rush in? The Institutional Context of Industry Creation," *Academy of Management Review* (19:4), pp. 645–670.

Allen, F., and Faulhaber, G. R. 1989. "Signalling by Underpricing in the IPO Market," *Journal of Financial Economics* (23:2), pp. 303–323.

Antweiler, W., and Frank, M. Z. 2004. "Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards," *The Journal of Finance* (59:3), pp. 1259–1294.

Aral, S., Dellarocas, C., and Godes, D. 2013. "Introduction to the Special Issue—social Media and Business Transformation: A Framework for Research," *Information Systems Research* (24:1), pp. 3–13.

Baron, R. M., and Kenny, D. A. 1986. "The Moderator--Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations.," *Journal of Personality and Social Psychology* (51:6), p. 1173.

Beck, R., Avital, M., Rossi, M., and Thatcher, J. B. 2017. "Blockchain Technology in Business and Information Systems Research," *Business & Information Systems Engineering* (59:6), pp. 381–384.

Booth, J. R., and Chua, L. 1996. "Ownership Dispersion, Costly Information, and IPO Underpricing," *Journal of Financial Economics* (41:2), pp. 291–310.

Chanson, M., Risius, M., and Wortmann, F. 2018. "Initial Coin Offerings (ICOs): An Introduction to the Novel Funding Mechanism Based on Blockchain Technology," in *Proceedings of the 24th Americas Conference on Information Systems (AMCIS)*, New Orleans, USA.

Clark, M., and Melancon, J. 2013. "The Influence of Social Media Investment on Relational Outcomes: A Relationship Marketing Perspective," *International Journal of Marketing Studies* (5:4), pp. 132–142.

Cliff, M. T., and Denis, D. J. 2004. "Do Initial Public Offering Firms Purchase Analyst Coverage with Underpricing?," *The Journal of Finance* (59:6), pp. 2871–2901.

CoinDesk. 2018. "ICO Tracker." (https://www.coindesk.com/ico-tracker, accessed April 22, 2018).

Dacin, M. T., Oliver, C., and Roy, J.-P. 2007. "The Legitimacy of Strategic Alliances: An Institutional Perspective," *Strategic Management Journal* (28:2), pp. 169–187.

Das, S. R., and Chen, M. Y. 2007. "Yahoo! For Amazon: Sentiment Extraction from Small Talk on the Web," *Management Science* (53:9), pp. 1375–1388.

Davila, A., Foster, G., and Gupta, M. 2003. "Venture Capital Financing and the Growth of Startup Firms," *Journal of Business Venturing* (18:6), pp. 689–708.

Deephouse, D. L. 1996. "Does Isomorphism Legitimate?," *Academy of Management Journal* (39:4), pp. 1024–1039.

Deephouse, D. L., and Suchman, M. 2008. "Legitimacy in Organizational Institutionalism," in *The SAGE Handbook of Organizational Institutionalism*, R. Greenwood, C. Oliver, R. Suddaby, and K. Sahlin (eds.), Thousand Oaks, CA: SAGE Publications, pp. 49–77.

Dell'Erba, M. 2017. "Initial Coin Offerings. A Primer," *SSRN*.

Dewan, S., and Ramaprasad, J. 2014. "Social Media, Traditional Media, and Music Sales.," *MIS Quarterly* (38:1), pp. 101–121.

Dowling, J., and Pfeffer, J. 1975. "Organizational Legitimacy: Social Values and Organizational Behavior," *The Pacific Sociological Review* (18:1), pp. 122–136.

Dunlap, J. C., and Lowenthal, P. R. 2009. "Tweeting the Night Away: Using Twitter to Enhance Social Presence," *Journal of Information Systems Education* (20:2), pp. 129–135.

FINMA. 2018. "ICO Guidelines," Swiss Financial Market Supervisory Authority. (https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung).

Ge, R., Feng, J., Gu, B., and Zhang, P. 2017. "Predicting and Deterring Default with Social Media Information in Peer-to-Peer Lending," *Journal of Management Information Systems* (34:2), pp. 401–424.

Goh, K.-Y., Heng, C.-S., and Lin, Z. 2013. "Social Media Brand Community and Consumer Behavior: Quantifying the Relative Impact of User-and Marketer-Generated Content," *Information Systems Research* (24:1), pp. 88–107.

Hampel, C. E., and Tracey, P. 2017. "How Organizations Move from Stigma to Legitimacy: The Case of Cook's Travel Agency in Victorian Britain," *Academy of Management Journal* (60:6), pp. 2175–2207.

Hayes, A. F. 2017. *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*, New York City, NY: Guilford Publications.

Hevner, A., March, S. T., Park, J., and Ram, S. 2004. "Design Science in Information Systems Research," *MIS Quarterly* (28:1), pp. 75–105.

Hoffman, D. L., and Fodor, M. 2010. "Can You Measure the ROI of Your Social Media Marketing?," *MIT Sloan Management Review* (52:1), pp. 41–49.

Ibbotson, R. G., and Ritter, J. R. 1995. "Initial Public Offerings," *Handbooks in Operations Research and Management Science* (9), pp. 993–1016.

Kaplan, A. M., and Haenlein, M. 2010. "Users of the World, Unite! The Challenges and Opportunities of Social Media," *Business Horizons* (53:1), pp. 59–68.
Kostova, T., and Zaheer, S. 1999. "Organizational Legitimacy under Conditions of Complexity: The Case of the Multinational Enterprise," *Academy of Management Review* (24:1), pp. 64–81.
Lamin, A., and Zaheer, S. 2012. "Wall Street vs. Main Street: Firm Strategies for Defending Legitimacy and Their Impact on Different Stakeholders," *Organization Science* (23:1), pp. 47–66.
Long, J. S., and Ervin, L. H. 2000. "Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model," *The American Statistician* (54:3), pp. 217–224.
Loughran, T., and Ritter, J. 2004. "Why Has IPO Underpricing Changed over Time?," *Financial Management* (33:3), pp. 5–37.
Lundmark, L. W., Oh, C., and Verhaal, J. C. 2017. "A Little Birdie Told Me: Social Media, Organizational Legitimacy, and Underpricing in Initial Public Offerings," *Information Systems Frontiers* (19:6), pp. 1407–1422.
Mai, F., Shan, Z., Bai, Q., Wang, X., and Chiang, R. H. L. 2018. "How Does Social Media Impact Bitcoin Value? A Test of the Silent Majority Hypothesis," *Journal of Management Information Systems* (35:1), pp. 19–52.
Miller, A. R., and Tucker, C. 2013. "Active Social Media Management: The Case of Health Care," *Information Systems Research* (24:1), pp. 52–70.
Oh, C., and Sheng, O. 2011. "Investigating Predictive Power of Stock Micro Blog Sentiment in Forecasting Future Stock Price Directional Movement.," in *Proceedings of the 32nd International Conference on Information Systems (ICIS)*, Shanghai, China.
Oh, O., Agrawal, M., and Rao, H. R. 2013. "Community Intelligence and Social Media Services: A Rumor Theoretic Analysis of Tweets during Social Crises," *MIS Quarterly* (37:2), pp. 407–426.
Pollock, T. G., and Rindova, V. P. 2003. "Media Legitimation Effects in the Market for Initial Public Offerings," *Academy of Management Journal* (46:5), pp. 631–642.
Preacher, K. J., and Hayes, A. F. 2004. "SPSS and SAS Procedures for Estimating Indirect Effects in Simple Mediation Models," *Behavior Research Methods, Instruments, & Computers* (36:4), pp. 717–731.
Qiu, L., Tang, Q., and Whinston, A. B. 2015. "Two Formulas for Success in Social Media: Learning and Network Effects," *Journal of Management Information Systems* (32:4), pp. 78–108.
Risius, M., and Beck, R. 2015. "Effectiveness of Corporate Social Media Activities in Increasing Relational Outcomes," *Information & Management* (52:7), pp. 824–839.
Ritter, J. R., and Welch, I. 2002. "A Review of IPO Activity, Pricing, and Allocations," *The Journal of Finance* (57:4), pp. 1795–1828.
Schlagwein, D., and Hu, M. 2017. "How and Why Organisations Use Social Media: Five Use Types and Their Relation to Absorptive Capacity," *Journal of Information Technology* (32:2), pp. 194–209.
Scott, S. V, and Orlikowski, W. J. 2014. "Entanglements in Practice: Performing Anonymity through Social Media," *MIS Quarterly* (38:3), pp. 873–893.
Shepherd, D. A., and Zacharakis, A. 2003. "A New Venture's Cognitive Legitimacy: An Assessment by Customers," *Journal of Small Business Management* (41:2), pp. 148–167.
Suchman, M. C. 1995. "Managing Legitimacy: Strategic and Institutional Approaches," *Academy of Management Review* (20:3), pp. 571–610.
Szabo, N. 1997. "Formalizing and Securing Relationships on Public Networks," *First Monday* (2:9).
Tumarkin, R., and Whitelaw, R. F. 2001. "News or Noise? Internet Postings and Stock Prices," *Financial Analysts Journal* (57:3), pp. 41–51.
Zimmerman, M. A., and Zeitz, G. J. 2002. "Beyond Survival: Achieving New Venture Growth by Building Legitimacy," *Academy of Management Review* (27:3), Academy of Management, pp. 414–431.
Zuckerman, E. W. 1999. "The Categorical Imperative: Securities Analysts and the Illegitimacy Discount," *American Journal of Sociology* (104:5), pp. 1398–1438.

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