

New blockchain intermediaries: do ICO rating websites do their job well?

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Abstract

The Fintech revolution, crowdfunding and blockchain-based funding have dramatically reduced borrowing and lending transaction costs. Many have argued that ultimately this should lead to the complete disintermediation of financing for start-ups and SMEs. However, persistent asymmetric information and moral hazard problems have led to the creation of a new class of intermediaries that play a vital role in these new innovative financing methods. We review the new ecosystem built around Initial Coin Offerings (ICOs), and in particular study the role of the ICO aggregators, listing and rating portals. Using our hand-constructed database of all ICOs from inception in 2013 to September 2017, we find robust statistical confirmation that extensive coverage of a particular fundraising campaign in the ICO aggregators' lists is associated with more successful token sales. However, ratings data seems to vary considerably across different ratings websites and appears to be of mediocre quality. Investors should therefore treat such ratings with caution.

Keywords: Financial industry, blockchain, ICOs, Rating agencies, Disintermediation, Fintech.

JEL codes: G24, G30, G32, L26.

The smooth functioning of the modern world economy would be unimaginable without financial intermediation. Whether one is discussing market-based economies with developed capital markets or bank-based economies that rely more on borrowing from banks for economic development – financial intermediaries such as banks and financial services firms are always present (Beck et al., 2010). Although classical financial economics posits that financial intermediation has no real effects per se (Allen, 2001), the very large body of academic research on this field proves its importance (Leland and Pyle, 1977, Gorton and Winton, 2003). Banks and the financial services industry in general seem to be irreplaceable when it comes to reducing transaction costs and asymmetric information frictions by providing services such as delegated monitors, information producers, liquidity providers and commitment mechanisms.

It has been argued that the innovation process should lead to the creation of new financial systems where intermediaries do not play such an important role – a process termed *disintermediation* in the literature (Allen and Santomero, 2001, Tufano, 2003). Rapid technological changes, internationalization and the advent of the Fintech in the financial industry, along with overregulation and its inability to adapt to the ever-changing and more volatile financing needs of smaller borrowers, have led to previously unheard-of forms of innovative financing methods. These new methods, usually termed Alternative Finance (AF), allow for capital from financial markets to be funnelled to corporate borrowers. This means they bypass or alter the conventional financial industry's channels that were adversely affected by the ongoing financial crisis which started in 2007 (Allen et al., 2013, Block et al., 2018, Boreiko, 2017).

Crowdfunding is the new AF method of funding start-ups by collecting funds from many investors. Having started as pure not-for-profit funds collection (donation-based) or prepayments for future product delivery (reward-based crowdfunding), crowdfunding turned out to be an appealing method for entrepreneurs or small enterprises to attract the needed seed capital (Ordanini et al., 2011). However, one of the main fundamental problems of crowdfunding is information asymmetry between lenders and borrowers or companies and equity investors (Vismara, 2018). The original crowdfunding model envisaged a decentralized process without a financial intermediary. This mutated back to the basics, whereby the crowdfunding platform took back a vital role in assessing projects before admission and also in ex-post monitoring of the borrowers as well. To survive their tough competition, the platforms that become de facto

financial intermediaries offering a wide range of pre- and post-issue services were the ones to attract the most lenders and investors (Rossi and Vismara, 2018). This reverse disintermediation (or *reintermediation*) process has become very pronounced over the last year. The new AF sector of direct lending to businesses by the crowdfunding platforms themselves (balance sheet business lending) that pool and invest the resources collected from the individual investors is growing rapidly in many countries.

The development of blockchains and smart contracts have abruptly shaken the whole system of borrowing and investing (Momtaz, 2018a). Many scholars and industry experts have argued that the internet, blockchains and distributed ledger technologies have finally removed the need for financial intermediaries, leading to a genuine revolution in the way SMEs obtain financing through ICOs or complete and final disintermediation. However, this is not really the case. Indeed, the first ICOs in 2013-2015 raised considerable funds in bitcoins, waves or ethereum cryptocurrencies directly from investors by issuing tokens and providing some means of future trading completely independently. Nevertheless, growing competition among blockchain start-ups, the larger scale of the projects and funds requested, higher frequencies of fraudulent activities and the need for smooth post-ICO trading of the created crypto tokens have led to the emergence of a completely new ecosystem of intermediaries (sometimes termed *cybermediaries*) that allow blockchain-based crowdfunding to function more efficiently.

Earlier empirical research focused primarily on the potential regulation of the ICO activity (Rohr and Wright, 2017, Zetsche et al., 2017), with later papers studying the potential determinants of ICO funding success. Adhami et al. (2018) collect very basic data on a sample of ICOs run mostly in 2017 only. Fisch (2018), Amsden & Schweizer (2018) and Blaseg (2018) use more recent samples and attempt to identify the success factors behind ICOs by looking at the funds raised and token listing status. Boreiko and Sahdev (2018) examine the host of the success proxies and show that these are correlated among each other but not with the post-ICO performance of tokens. Howell, Niessner and Yermack (2018), Momtaz (2018a, 2018b and 2018c) and Benedetti and Kostovesky (2018) instead look at post-ICO performance as a measure of success, such as trading volume, liquidity, first-day underpricing and long-run returns.

The clear and robust finding emerges from the literature that ICOs which signal they are of better quality, reduce the level of asymmetric information and take measures to reduce moral hazard problems manage to be relatively more successful, as measured by several proxies. Among the proxies used were the availability of detailed and public whitepapers (WPs), publicly available project codes on GitHub, conducting a token pre-sale (Adhami et al., 2018, Fisch, 2018), founders' loyalty as measured by their average tenure over all past employments (Momtaz, 2018c), and use of euphemistic language in WPs to market the token sale to investors (Momtaz, 2018d).

As with the external certification of a borrowers' quality (i.e. ability to repay) by fixed-income credit rating agencies (Fitch, Moody's and Standard & Poor being the top three), many online platforms have started to provide external-party listings, analysis and rating services to investors who need more information about these investment projects. While there were 51 listing platforms existent at the end of 2017 (Appendix 1 provides a complete list), some maintain only basic lists of current and future ICOs with scant information about each project. Others offer full-scale reports on particular ICOs, while some even rate the projects to give investors indications about the relative quality of the featured ICOs. Poor data quality, neglect of past ICOs, a focus on fashionable hyped ICOs, obscure rating-assignment rules, and frequent inclusion in the list of fraudulent offers (due to the issuer-pays nature of the business) have led to the widespread opinion that these lists and ratings do not reduce asymmetric information about the ICO projects.

An exploratory investigation into listing and rating platforms has received only limited attention in the academic literature. Hartmann, Wang and Lunesu (2018) conduct a qualitative analysis of 28 websites that featured ICO evaluation. Their findings show scarce clarity in ICO evaluations, with websites like Icobench and Icomarks providing more quantitative judgments as well as websites providing text-based reviews (Globalhalo, Blockdiscover). Momtaz (2018a) extensively studies the explanatory power of the Icobench ratings of ICO management teams, their vision, and ICO profiles along with other measures of success such as ICO gross proceeds, money "left on the table", time-to-market, and project failure.

This paper provides some evidence of the predictive power of the assigned ratings on several ICO success measures, and also looks at the overall listing intensity on seven

comprehensive ICO aggregator websites. We contribute to the growing body of ICO research by analysing the main ICO rating and listing providers, and test the hypothesis that these are good predictors of the success of an ICO campaign.

We hand-collect data on token sales, which ran from 2013 to September 2017, and their rating/inclusion in the major aggregator websites as at the end of September 2017. Using lists from seven of the largest ICO tracking websites¹ and textual searches in the Bitcointalk ICO forum, we construct a complete dataset of all ICOs at least partially marketed to investors using the English language. We use a synthetic measure of ICO publicity and information dissemination by counting the number of times this ICO is included in the lists created by the seven ICO aggregation websites, and provide evidence that listings on several ICO aggregators are indeed associated with ICOs subsequently raising more funds or collecting more than US\$100k. Being listed also raises the probability of reaching either the minimum funding goal (min cap) or maximum requested amount (hard cap), even after controlling for other explanatory factors.

Given the issuer-pays model of rating assignment used by virtually all ICO aggregators, we acknowledge that such a finding might be explained by bigger available marketing budget and wider publicity of a particular ICO, which results in greater success. We therefore analyse ratings assigned by four listing websites. At the end of September 2017 individual ratings data seems to vary considerably across the selected sources and appears to be of mediocre quality. We find that while individual ratings from several websites are significant in explaining the total funds raised in ICOs, they have no explanatory power to predict if token sales would reach their min or hard caps. Bearing in mind rating methodology changes and the fact that ratings are frequently modified or rightly assigned only after ICO campaigns, our findings indicate that investors should treat such ratings with caution.

The rest of the paper is organized as follows. In Section 2, we briefly overview the new ecosystem of blockchain funding, identifying new cybermediaries and their role in the process. In Section 3, we analyse ICO aggregators and rating providers and posit the main hypotheses of the paper. Section 4 presents the data set and the econometric results and conducts a number of robustness checks on the findings. The last section provides a number of conclusions.

¹ Smith & Crown, Tokenmarket, Icobazaar, Coinschedule, Hubcoin, Icodata, and Icoprojectrank.

2. New ecosystem of blockchain financing

An Initial Coin Offering (ICO) is generally defined as a public offering of new crypto tokens in exchange for existing tokens. During an ICO, private or institutional investors acquire newly issued tokens with pre-determined rights by irrevocably sending their funds to the ICO wallet. Consequently, firms issuing these tokens or coins use the collected funds to develop their venture project. An excellent and more detailed account of the ICO fundraising mechanism and major milestones of blockchain-based funding is given in the introduction to this special issue.

The explosive growth of ICO campaigns along with the considerable sums raised by start-ups in only a few hours or days led many experts to conclude that the era of complete disintermediation had arrived and financial intermediaries would soon be a thing of the past. This proved to be incorrect, and the elimination of transaction costs was only a part of the story. Many fraudsters saw an opportunity to collect funds from naïve investors who had no means of identifying sound projects. Moreover, to make the issued coins or tokens truly liquid, issuer- or investor-run ad-hoc exchanges were insufficient. Given the demand, a new range of financial blockchain intermediaries has therefore emerged, and by 2018 had evolved into a versatile and mature industry whose main types we introduce below.

Communication intermediaries.

Despite being somewhat similar in nature to crowdfunding campaigns and IPO listings, the marketing of ICOs differs significantly. In IPOs, while the main awareness-raising activities include marketing roadshows and events, the main effort is exerted by the underwriter through their network of institutional investors. In crowdfunding, a centralized platform such as Kickstarter, Crowdcube or Indiegogo runs all campaigns on behalf of the lender. With ICOs, all these activities should in theory be independently administered by each entrepreneur. To maximize the publicity of their projects, the founders use several tools – information dissemination (own website, GitHub, blogs (Medium.com), social media (Twitter, Facebook, and LinkedIn)), Q&A hosting services (Reddit, Bitcointalk forums) or full-scale communication channels (Telegram, Slack).

Given the growing interest in ICOs and associated increased demand for ICO services, many (mainly online-based) agencies have been set up specifically to offer consultancy and advice to individuals that want to launch an ICO. ICObox, Amazix, Searched, Crynet and Foxtail are some of the best known of these. Generally, they act as business facilitators or promoters offering marketing expertise and know-how on selling business ideas and identifying which channels to use in order to successfully run an ICO. Some only focus on ICOs, while others also provide other online marketing services.

Financial intermediaries.

The first ICO campaigns demonstrated that one of the biggest problems of this fundraising method was the risk of fraud and absence of trust in entrepreneurs who were asking for funding, as the whole process was administered entirely online. Some individuals quickly began to offer escrow services by acting as a trusted third party that collected, held and disbursed funds according to predetermined rules, usually upon reaching specific milestones announced by the ICO teams. These escrow agents (the most famous of which is SebastianJu operating on bitcointalk.org) operated in a similar fashion to conventional escrow services for online trading platforms in ensuring that the ICO fundraisers would not run away with the collected money. ICO escrow services are still active today, with professional intermediaries now occupying this niche (such as the IBC Group, Openledger and others).

Rapid development of smart contracts led to the creation of multisig² Ethereum wallets that allowed for fund transfers only with the permission of several parties. This was used by the fundraisers as an alternative to escrow services. However, quite often the signatories were selected by the lenders themselves from the project's advisers or affiliated parties, thus reducing the credibility of the project. To gain an independent third-party certification, some projects run their ICOs directly on online crypto exchanges (such as Bittrex) which allow them to collect funds and distribute tokens to investors for a predetermined fee.

² Multisig or multisignature is a form of technology used to add additional security for cryptocurrency transactions. Multisignature addresses (wallets) require another user or users sign a transaction before it can be validated and appended to the blockchain.

As the projects grew in size and investors exhibited considerable interest in contributing to them using fiat money, new financial intermediaries appeared. Their main task was to run a full contribution campaign on behalf of the ICO teams, conduct needed compliance procedures such as Know-Your-Customer or Anti-Money-Laundering measures, and to handle contributions in dollars, euros and other currencies that require a bank account. These specialized ICO listing platforms offered additional brokerage and related services to crypto investors, and quickly became a vital part of any smooth ICO campaign. While such platforms were fairly popular in China before the ICO activity ban in September 2017 (ICO365 and Bzhongchou platforms), they were later ordered to shut down. Bitcoin Swiss AG - a regulated crypto financial broker, asset manager and service provider based in Zug, Switzerland - was often used by large-scale crypto projects to administer a part of the offering targeted at wealthier investors. Exhibit 1 demonstrates the relative frequency of financial intermediaries' participation in our ICO sample.

Exhibit 1. Frequency of the financial intermediaries' participation in the ICO activity

	Unknown	No	Escrow	Multisig wallet	Exchange/ICO platform
Financial intermediary	1%	64%	23%	4%	8%

Note: The Exhibit shows the percentages of the total sample. Multisig wallet refers to a form of technology used to add additional security for cryptocurrency transactions by requiring permission from several parties before funds may be transferred to other address.

Smart contract security auditors.

The first ICOs run on the Ethereum blockchain with smart contracts demonstrated very low knowledge of smart contract coding. The spectacular loss of US\$60 m USD from funds collected by *The DAO* ICO and subsequent repercussions resulted in the Ethereum network's hard fork³, which put off many investors from lending money to other ICO projects. Developers of subsequent projects either posted their smart contracts' code to GitHub for public inspection, offered rewards for finding potential breaches, or used the audit services of smart contract specialists such as Zeppelin Solutions to lend credibility to the project.

³ A 'hard fork' is a permanent radical divergence from the previous version of the blockchain, with the majority of nodes following the upgraded blockchain and the other path continuing along the old path.

Online cryptoexchanges.

One of the biggest advantages of the ICO granted to investors is the ability to easily and quickly trade their stake in a project – something impossible with early-stage investments through venture capital (VC) or crowdfunding. To provide such liquidity, the companies issuing tokens have to get them listed on at least one of the cryptocurrency exchanges. Similar to stock and commodity exchanges, these online exchanges offer an online venue for people wishing to trade tokens. High demand for token liquidity led to the explosive growth of this class of crypto intermediaries. As of September 2018, data from coinmarketcap.com shows 224 active crypto exchanges that list more than 2,000 cryptocurrencies. These intermediaries become more and more important as ICO investors care more about future exchange listings than the technical details of individual projects. As a result, crypto exchanges might charge extortionate fees before admitting tokens for trading.⁴

Listing and rating ICO aggregators.

While communication intermediaries provide the means to interact with potential investors, the content is generated by ICO teams and therefore subject to manipulation and falsification. With the increased number of ICOs, many online platforms started to offer third-party information on token sales. At minimum, these websites provide a public list of all upcoming, running and sometimes concluded ICOs. Many also include details of the projects, identity checks on founders, financials of the ICO and general ratings. Such a rating summarizes the overall reliability and quality of the ICO, and thus signals to the crowd the relative quality of the investment. Such services are all of the issuer-pays type, and resemble very much the business model of the fixed-income credit ratings agencies such as Fitch, Moody's and S&P's.

Quite often the quality of the service provided is relatively poor, resulting in frequent incorrect data and double entries. Nevertheless, the websites charge considerably high fees, which the ICO promoters have to pay in order to have the offering listed as this third-party endorsement might signal a better-than-average quality of the project to investors. Indeed, many ICO projects

⁴ Anecdotal evidence points to the upper estimate of listing costs close to \$1 million with smallest price tag exceeding US\$ 50,000 (UK Business Insider, 2018).

proudly alert investors about favourable ratings or inclusion in the list of a particular ICO aggregator. Whether such an endorsement represents a positive signal regarding the quality and future success of the project is analysed in the following sections.

3. Data

To study the importance of listing and rating platforms, we have used a sample of 316 ICOs from 2013 to September 2017 obtained from Boreiko and Sahdev (2018). As of September 2017, 51 platforms (for a complete list see the Appendix 1) provided listing services with maintained and publicly accessible lists of active and forthcoming ICOs. 18 websites claimed to assign ratings to ICOs; however, given that the majority were created in the second half of 2017 and focus on active and forthcoming ICOs, only three of these (Icodata, Smith & Crown and Tokenmarket) satisfactorily covered the past ICOs while an additional four (Icobazaar, Icobench, Icoholder and Icomarks) also provided numerical ratings.⁵ Of the four websites in our database which assign a rating, each one uses different rating and fee schemes (as of the end of September 2017):

Icomarks: the rating is calculated using various criteria weighted by their subjective importance, including: founders' and advisors' profiles evaluation; proof-of-concept; technology layer and Most Viable Product (MVP) evaluations; and token utility, network effect and business evaluations (market potential, project financial valuation, supply sold, competition, media presence and team's tokens vesting and incentives). While a regular listing is free, they charge one Ether (ETH) for priority listings (within 24 hours after request). Ratings range from 0 to 10.

Icoholder: the listing is free for selected high-potential ICOs; otherwise, the base flat rate is 1.5 ETH. The website also offers other related services, ranging from US\$150 for simple priority updates to US\$19,500 for the premium ultimate option, which grants the removal of competition from the ICO profile and direct email access to Icoholder's 50,000 subscribers and social-media lists, as well as a pinned-on-top listing for one week. However, Icoholder does not disclose any information on how the rating is calculated. Ratings range from 0 to 5.

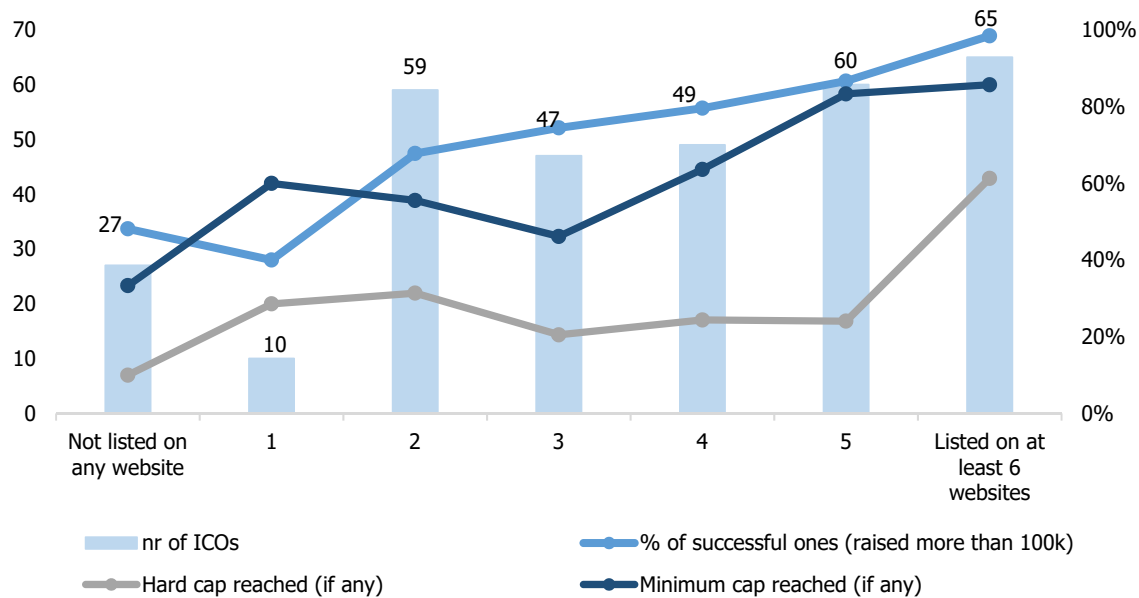
⁵ Several other ICO listing websites also disclosed partial lists of past ICOs. However, either we were unable to obtain the complete lists or the lists only marginally covered the ICOs from the 2013-2016 subsample period (matching less than 10% of the token sales in our sample).

Icobench: one regular listing is formally granted for free, with prices ranging from 0.1 bitcoin (BTC) for priority listing (the website has a long waiting list and regular listing requires a wait of several months) up to 41 BTC for the Premium-hit pack. This package includes full analytical review, places the ICO on top of the list for 30 days, removes competition from the ICO profile and provides priority updates. With regards to ratings, Icobench makes use of an algorithm which constantly updates the score using 20 different criteria and is weighted along with the ratings of the website-registered experts. These ratings are publicly available, along with details of the experts. Ratings range from 0 to 5.

Icobazaar: prices for a listing in Icobazaar range from 0.03 BTC for basic project-verification to 1.2 BTC for priority listing, 30-day visibility and personalized advice. Icobazaar uses five criteria (project idea; whitepaper; team, media and community; technical implementation; website) to obtain a rating. This is then weighted by website-registered experts using criteria that are not publicly available. Ratings range from 0 to 5. In November 2017 the rating methodology was modified, ICO lists updated and ratings were converted to a system using AAA (best investment) – C (minimum chance to succeed). In our analysis we used the old ratings data from Icobazaar which appeared on their website in October 2017.

We assign a numerical rating (which we call the *coverage ratio*) to each ICO that measures the frequency of being included in one of the seven rating platforms' ICO lists. Of the seven websites under study, we note that 65 out of 316 ICOs are reported by 6 or more websites while only 12 are present in all seven lists. More than 50% of the ICOs in our sample (215) are listed on 2 to 5 websites, and only 27 (8.5% of the sample) are not included in any list. Exhibit 2 illustrates certain positive relationships between the coverage index and the percentage of ICOs reaching the minimum cap, hard cap or raising more than US\$100k.

Exhibit 2. ICO Coverage index and success factors



Note: The bars denote the number of ICOs in each subset, while coloured lines denote the related underlying percentage of successful offerings that raised more than US\$100k, reached the minimum cap or the maximum cap.

We thus posit our first hypothesis as:

H1: the coverage ratio positively affects the success of the particular ICO fundraising process.

We acknowledge that in recent times most of the ICOs included in the various lists pay to be included. The intensity of the ICO coverage might therefore not be a reliable indicator of the aggregators' ability to screen, select, and list better ICOs, but rather a proxy for the size of a particular ICO's marketing budget. Still, we believe our approach is justified on two grounds. Firstly, our sample contains early-stage ICOs from a time when pay-to-list services were not yet widely used. Secondly, to attract investors, the listing websites had to create an initial database with large coverage and therefore were compiling the lists and selecting ICOs without any charge.

To provide an alternative test of aggregators' ability to signal the quality of ICOs, we focus on the individual ratings assigned to each ICO on the list. In theory, this is done objectively and independent of the similar listing fee for all clients. It should therefore follow that ratings assigned could serve as valid signals about the quality of the projects and ultimately their future success. Since three out of four rating services rank projects on a zero-to-five scale, we are able to aggregate these (Icomarks rating is divided by 2 to make it comparable with the rest) and create

an average rating for each ICO in the sample. Assuming all four ratings providers do due diligence and are able to identify correctly the quality of the projects, we put forward the second hypothesis.

H2: the average rating is a good predictor of a project's quality and its future success.

Exhibit 3. ICO Lists' matching and ratings correlation matrix

	Icoholder	Icobench	Icomarks	Icobazaar
Total list size	365	202	70	240
Matched ICOs	233	180	51	207
% of correct	63.8	89.1	72.9	86.3
Average rating	3.0	2.8	2.4*	3.3
	Correlations between ratings			
Icoholder		0.471 <i>0.004</i>	0.799 <i>0.000</i>	-0.175 <i>0.402</i>
Icobench			0.719 <i>0.000</i>	-0.072 <i>0.733</i>
Icomarks				-0.121 <i>0.564</i>

Note: Matched ICOs show the number of true ICOs (excluding cancelled, postponed or non-ICO entries) that are included in our sample of 316 ICOs. Correlation matrix displays correlation coefficients with the p-values below. Values significant at 5% are in bold.

* - Icomarks average rating was divided by 2 to turn it into a 0-5 scale.

In Exhibit 3 we highlight some basic statistics on the completeness and correlation of ratings among the four rating services. All the lists are incomplete, as shown by matching against our database, and contain between 64% and 89% of the correctly identified ICOs. All four ratings services differ in the average ICO rating, and in addition, Icobazaar's ratings do not seem to be correlated with the other three databases.

The statistics above show that the assigned ratings are quite heterogeneous, and taking an average of all four might hide the fact that some ratings providers do a better job of identifying quality ICOs and rate them correspondingly higher than others do. We therefore control if higher ratings are given to more successful ICOs as measured via the binary variables of whether they raised at least US\$100k, reached minimum or hard caps. We report the results for the Icoholder rating database in Exhibit 4, which shows that ICOs with higher ratings do raise more than the

US\$100k threshold and reach minimum and hard caps more often.⁶ Given the univariate results, we formulate our last hypothesis as follows:

H3. Ratings assigned by individual ratings websites serve as good predictors of future ICO success.

Exhibit 4. Icoholder ratings distribution for success measures

Minimum cap	<i>No mincap</i>	Capped	Reached	Not reached	% Reached
Rating higher than 4	7	6	6	0	100.0%
Rating between 3 and 4	45	50	47	3	94.0%
Rating lower than 3	74	51	28	23	54.9%
<i>Average</i>					71.3%
Hard cap	<i>No hardcap</i>	Capped	Reached	Not reached	% Reached
Rating higher than 4	5	8	8	0	100.0%
Rating between 3 and 4	54	41	38	3	92.7%
Rating lower than 3	78	47	23	24	48.9%
<i>Average</i>					67.4%
Raised more than \$100k		Total	Yes	No	% Reached
Rating higher than 4		13	13	0	100.0%
Rating between 3 and 4		123	100	23	81.3%
Rating lower than 3		125	102	23	81.6%
<i>Average</i>					77.9%

Note: the exhibit demonstrates percentages of successful ICOs according to Icoholder assigned rating.

4. Regression analyses

Unlike crowdfunding, where the success of the campaign can be measured by the ability of the project to raise the funds requested, in the ICO industry success may mean many things. The empirical literature on an ICO’s determinants of success has used the following proxies:

Total funds raised. This is an intuitive measure that directly shows the investor’s interest and beliefs in the project. Having been used in crowdfunding (Mollick, 2014, Ahlers, et al., 2015) and VC-funding research (De Clerq and Dimov 2008, Cumming et al., 2005), several scholars (Fisch, 2018, Momtaz, 2018a and others) have used this proxy to measure ICO success.

⁶ We run a similar analysis for the other three rating services with the data available from the authors upon request. We obtain similar results with Icobench and Icomarks data.

Listing on online cryptoexchanges. Amsden and Schweizer (2018) argued that the ultimate measure of an ICO's success is the ability of founders to provide for post-ICO trading of the issued tokens. From one side, listing tokens is costly as discussed above, and only teams which are very positive about their project's success may be ready to bear the costs of such a signal. From the other side, if one takes listing on any crypto exchange (currently there are 224 active ones) as a signal, such a signal is very easy for even poor or fraudulent ICOs to mimic.

Minimum cap reached. Adhami et al. (2018) consider an ICO to be successful when the min cap, namely the minimum stated amount of funds that the venture wants to collect, has been reached. Indeed, this measure fits perfectly with ICO being a blockchain-based version of ordinary crowdfunding. If the minimum requested sum is raised, then the entrepreneur has enough funds to start the project. However, if insufficient funds are collected, as Boreiko and Sahdev (2018) demonstrated, this definition may become misleading: there are enterprises which start projects despite not having reached their minimum-funds target, and even ICOs with no stated minimum cap. Moreover, this variable does not take into consideration the extent to which the goal has been missed.

Hard cap reached. The hard cap is an arbitrary maximum financial goal defined by the ICO's launchers which can be used as a qualitative dummy variable to define the success of a coin offering. This variable may well indicate fundraising has been a big success, as funds ready to be committed to the project may well exceed the maximum estimate by the founders. Moreover, it might serve as a signal of the founder's sensibilities, the seriousness with which they treat the project and the absence of greed. Boreiko and Sahdev (2018) used this measure as one of the ICO success indicators.

Funds raised above certain threshold. Fenu et al. (2018) enlarged the definition of ICO success by considering all ICOs that raised at least US\$200k to be successful. Given the complexity and riskiness of the blockchain start-ups, they argue it is hardly possible to bring a project to success unless a certain budget is available.

Long-run token price performance. The same authors suggested projects should be considered successful if their tokens do not lose more than 75% of their market capitalization within the first six months after their first trading price. Alternatively, it is possible to look at the underpricing of

the tokens (Momtaz, 2018b) or total long-run performance of the token as an indicator that the project is a valid and a long-run one (Boreiko and Sahdev, 2018).

For the multivariate analysis, we decided to use the total funds raised as our main proxy of success and to test the robustness of the results with minimum and hard cap dummies. We use the natural logarithm of the total funds raised expressed in US\$, and run the OLS regressions on the variables of interest and some controls that were used in the literature to predict the success of ICOs. We have selected the following control variables.

White paper. Although previous studies (Fisch 2018, Adhami et al., 2018) show that the WP availability is not significant, we use it as a control variable since our sample includes ICOs run in a period when WP availability was not a de facto standard. Indeed, only 70% of all ICOs in the sample published their WP. Moreover, as Momtaz (2018d) demonstrates, WPs and in particular euphemistic language used by founders do have an effect on project success.

Number of Twitter followers. Social media platforms are used extensively to advertise the projects and create community of followers. Greater public interest indicates more investor demand, which directly affects the success of the future ICO. Twitter is one of the most popular social networks and is often used to divulgate crypto-related content and reach out to crypto-enthusiasts. We hence include a logarithm of total Twitter followers before the start of the ICO campaign (data obtained from archived Twitter pages on archive.org) of the relevant Twitter account.

Blockchain selected. Most ICOs use Ethereum blockchains for their tokens, at least during the initial phase of their projects. Using well-established, relatively secure blockchains might give advantages to such projects compared to other blockchains chosen, such as own one or Waves, Counterparty, etc.

Country of incorporation. Based on previous research (Fenu et al., 2018, Adhami et al., 2018 and others) we might also expect that some crypto-friendly environments are capable of nourishing successful ICO projects.

Time period. ICO fundraising gained considerable momentum in the second half of 2017, so we might expect ICOs launched after May 2017 to be more likely to succeed.

Cryptocurrencies momentum. We also attempt to control for ‘the industry effect’, including the average Bitcoin and Ethereum log-prices during the relevant ICO periods. The rationale behind this is that the whole amounts invested in ICOs vary with cryptocurrency momentum and their popularity among the non-Fintech-community. Since the Bitcoin is the first traded crypto and both ETH and BTC have become the most known and important cryptocurrencies from 2016, it might be that there is an external effect attributable to the total funds invested in ICO projects.

Venture Capital backing. The backing of a VC fund prior to the ICO may also be extremely important in raising funds, as it certifies the quality of a VC-backed ICO. Indeed, all VC-backed ICOs in our database reached at least the minimum, and met the hard cap as well if present. To identify VC-backed ICOs we have looked at the announcements issued by fundraisers and run Google search to find out if a particular ICO obtained VC financing prior to the token sale⁷. As a rule, we require clear confirmation from the fundraiser of the VC investment, or alternatively two external confirmations of the VC participation.

We report the correlations between ratings and control variables in Appendix 2, where we do not observe any potential multicollinearity problems. The results of the multivariate analysis are presented in Exhibit 5. Model (1) is the base-line model with controls only, while Model (2) is run with coverage ratio variables and models (3) – (7) and also includes average and four individual ratings. We observe the following results. The coverage ratio is always positive and significant (except for the model (7) that has very few observations due to the small Icomarks matched database size). The average rating is not a predictor of an ICO’s success due to the high variability in the quality of the ratings. Indeed, models (4) - (7) confirm this result, showing that only two of the four studied rating services - Icoholder and Icobench - publish ratings that predict to some extent the future funds raised by each project. The ratings from these two providers are highly correlated, although Icoholder ratings seem to be of better quality. This might be explained

⁷ We also collected information on VC investments during and in the post-ICO periods; however, only pre-ICO VC investments were considered.

by Icobench methodology, which weights its own ratings with expert scores, as this appears not to be doing a good job after all.

To test the robustness of the results, we run similar binary Logit regressions on another two measures of ICO success – minimum cap and maximum cap reached dummies.⁸ The coverage ratio is again statistically significant in any specification and the average rating is always insignificant. Surprisingly, individual ratings of any ICO aggregator are not significant anymore and as such cannot be used as good predictors of whether an ICO project would reach its minimum or hard cap.

Exhibit 5. OLS regressions of the logarithm of total funds raised on rating proxies and control variables

OLS regressions	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Coverage ratio		4.862***	6.612***	6.220***	2.633*	8.128***	6.895
Average Rating			0.002				
Icoholder rating				2.441***			
Icobench rating					1.021***		
Icobazaar rating						0.926	
Icomarks rating							0.095
Ln (Twitter followers)	0.366***	0.246***	0.245***	0.156*	0.290***	0.306**	0.132
VC-Backed venture	2.908***	2.827***	2.795***	2.052***	1.714**	2.076***	5.133**
ETH momentum	0.321	0.24	0.143	-0.287	0.394	0.079	-1.091
BTC momentum	-0.032	-0.101	-0.148	-0.119	-0.131	0.135	-0.419
Post May-17 ICO	-0.094	-0.479	-0.129	0.815	-0.186	-0.224	3.441
Swiss jurisdiction	1.955	1.578	1.364	0.913	0.49	0.745	1.888
Slovenia jurisdiction	1.817	2.234	2.08	0.905	0.262	1.663	3.903
USA jurisdiction	0.019	0.044	-0.331	-0.457	-0.378	-0.196	-1.936
WP	0.054	-0.091	0.122	-0.12	-1.457	0.041	0.553
ERC20 Token	1.134	0.602	0.335	-0.224	1.084*	-0.18	-0.109
Constant	YES	YES	YES	YES	YES	YES	YES
Adjusted R ²	0.179	0.225	0.224	0.306	0.301	0.257	0.003
N. of Obs.	291	291	260	217	178	194	49

Note: Coverage ratio is defined as the total number of entries of each ICO in seven rating lists divided by seven. ETH- and BTC-momentum are defined as average prices during the ICO periods of ETH and BTC respectively. WP is the dummy variable taking a value of one if the project published a White Paper and zero otherwise. ERC20 Token is the dummy variable taking a value of one if a project's token is developed on Ethereum blockchains and zero otherwise. ***, **, * denote the significance of the

⁸ Results are not reported but available from the authors upon request.

respective coefficients at 1, 5, and 10%.

5. Concluding remarks

This paper contributes to the existing research on blockchain funding with ICOs and constitutes, to the best of our knowledge, one of the first empirical studies on the relationship between ICO funding and ratings assigned by several listing websites. Overall, we document the rapid and disrupting development of the new financial and general intermediaries that operate completely outside of the conventional financial industry. Our results confirm the hypothesis that the coverage ratio is a significant explanatory variable for ICO success, and refute our second hypothesis that average ratio is indicative of ICO success. We also provide partial evidence on the predictive power of the individual ratings of several ICO aggregators, which are not robust to different success definitions. Ratings data apparently varies across different ratings websites and seem not to be of great quality, so investors should treat such ratings with caution.

The introductory overview on the marketing of an ICO and operations of the listing and rating websites describes the main established practices of these bodies. It forms a basis for further in-depth investigation, expanding the sample of ICOs and the ever-growing number of listing and rating websites. The conflicting evidence for ratings usefulness also calls for more in-depth research in order to properly assess the impact of ratings on the fundraising process. In addition, it might be of considerable interest to general public to study how the sums paid for listings correlate with the ratings awarded.

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Appendix 1. List of the ICO aggregators and listing websites as at September 2017.

BestIcolists, BestIcorate, Bitcoinwiki, Coingecko, Coinist, Coinschedule, Coinstaker, Cointelegraph, Concourseq, Cryptorated, Cryptostreet, Cryptovest, Cyberfund/radar, Digrate, Foxico, Hubcoin, Icoalert, Icoarchives, Icobazaar, Icobazaar_new, Icobench, Icobuffer, Icocountdown, Icocrunch, Icodata, Icodrops, icohills, Icoholder, Icolink, Ico-list, Icomarketcap, Icomarks, Icomonitor, Icomsec, Iconow, Icoplace, Icoprojectrank, Icorating, Icoslots, Icotracker, Icovoting, Icowatchlist, Icowhitelists, LongCatChain, Smith&Crown, tokendata, Tokenmarket, tokens24.com, Tokentops, Tokenwhois, Trackico.

Appendix 2. Pairwise-correlations matrix of the main variables.

	Average Rating	Icoholder rating	Icobench rating	LN of total funds raised	Raised more than US\$100k	Minimum cap reached	Hard cap reached	LN of Twitter followers	VC backed venture	ETH-blockchain based	Post May-17 ICO
Coverage ratio	0.39 <i>0.00</i>	0.17 <i>0.13</i>	0.09 <i>0.42</i>	0.34 <i>0.00</i>	0.31 <i>0.01</i>	0.13 <i>0.26</i>	0.21 <i>0.07</i>	0.38 <i>0.00</i>	-0.06 <i>0.59</i>	0.12 <i>0.30</i>	0.17 <i>0.14</i>
Average Rating		0.75 <i>0.00</i>	0.77 <i>0.00</i>	0.36 <i>0.00</i>	0.16 <i>0.16</i>	0.28 <i>0.01</i>	0.15 <i>0.21</i>	0.52 <i>0.00</i>	0.06 <i>0.63</i>	0.26 <i>0.02</i>	0.00 <i>0.99</i>
Icoholder rating			0.78 <i>0.00</i>	0.4 <i>0.00</i>	0.22 <i>0.06</i>	0.36 <i>0.00</i>	0.29 <i>0.01</i>	0.53 <i>0.00</i>	0.07 <i>0.54</i>	0.22 <i>0.05</i>	-0.06 <i>0.58</i>
Icobench rating				0.42 <i>0.00</i>	0.25 <i>0.03</i>	0.4 <i>0.00</i>	0.26 <i>0.02</i>	0.51 <i>0.00</i>	0.03 <i>0.82</i>	0.31 <i>0.01</i>	-0.10 <i>0.40</i>
LN funds raised					0.71 <i>0.00</i>	0.74 <i>0.00</i>	0.36 <i>0.00</i>	0.42 <i>0.00</i>	0.18 <i>0.13</i>	0.39 <i>0.00</i>	0.12 <i>0.31</i>
Raised more than US\$100k						0.66 <i>0.00</i>	0.27 <i>0.02</i>	0.45 <i>0.00</i>	0.15 <i>0.20</i>	0.23 <i>0.04</i>	-0.11 <i>0.32</i>
Minimum cap reached							0.30 <i>0.01</i>	0.42 <i>0.00</i>	0.17 <i>0.15</i>	0.25 <i>0.03</i>	-0.06 <i>0.60</i>
Hardcap reached								0.32 <i>0.01</i>	0.24 <i>0.03</i>	0.08 <i>0.47</i>	0.04 <i>0.72</i>
LN Twitter followers									0.06 <i>0.65</i>	0.27 <i>0.03</i>	-0.25 <i>0.04</i>
VC backed venture										0.08 <i>0.47</i>	0.15 <i>0.20</i>
ETH-blockchain based											0.12 <i>0.29</i>

Note: p-values are below each correlation coefficient. Statistically significant coefficients at 5% confidence level or below are shown in bold. Coverage ratio is defined as the total number of entries of each ICO in seven rating lists divided by seven. ETH Blockchain is the dummy variable taking value of one if project's token is developed on Ethereum blockchain and zero otherwise.