Initial Coin Offerings and Entrepreneurial Finance: *The Role of Founders' Characteristics*

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Entrepreneurs have traditionally faced severe frictions in accessing external capital. Asymmetric information restricts most arms-length retail investment to those with physical proximity to and personal connections with venture investors (Hall and Lerner 2010; Chen et al. 2010; Howell, Niessner, and Yermack 2018; Momtaz 2018a). Initial coin offerings (ICOs), a new financing instrument that allows start-ups to sell blockchain-based digital tokens for capital on the Internet, permit young ventures to access external financing with less of these frictions. During 2014–2018, the ICO market has experienced explosive growth, with the amount of capital raised exceeding $18 billion, a size comparable to the national GDP of Bosnia in 2017 (Howell, Niessner, and Yermack 2018).

Given its important role in facilitating entrepreneurial finance and the enormous amount of capital it raised, an emerging literature has focused on the determinants of successful ICOs (Momtaz 2018b, 2018e). Momtaz (2018c) examines the impact of CEO emotions on ICOs underpricing and finds that firms experience more underpricing when CEOs signal fear or anger in photos and video materials. Using CEO's cumulative tenure on previous jobs as a measure of loyalty, Momtaz (2018a) shows that CEO's loyalty is negatively associated with ICOs underpricing and positively related

to firm's long-run success. On disclosure quality, Blaseg (2018) finds that young ventures that disclose higher quality source codes are more likely to list on a public exchange shortly after ICOs. While insightful, this literature has not evaluated founders' characteristics, individually and collectively, in a systematic way. This article aims to bridge this gap.

In this study, we systematically study the effects of founders' characteristics on firm's success in ICOs, using a unique hand-collected sample of 986 ICOs from Token-Data.[1] Drawing parallels between ICOs and crowdfunding and venture capital, where a large literature examines the relationship between founder characteristics and firm performance, we first evaluate whether the disclosure of founding members' personal information help start-ups (a) raise more capital in ICOs and (b) increase the speed of fundraising. In particular, we consider the disclosure of founder's personal information in three key aspects: educational background, work experience, and social network, all of which are found to be important determinants of firm performance in venture capital and crowdfunding literature (Sapienza and Grimm 1997; Barringer, Jones, and Neubaum 2005; Bhagat, Bolton, and Subramanian 2010).

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[1] Data can be accessed at www.TokenData.io.

Distribution of ICOs among Countries

Panel A: Number of ICOs

	Number	Rate
Total ICO projects	986	100%
Completed ICO projects	753	76.37%
Failed ICO projects	233	23.63%

Panel B: Distribution of ICOs among Countries

Country	No.	Percent	Capital	Percent	Success%	Fail%
USA	156	19.80%	2771.14	22.75%	88.46%	11.54%
UK	106	13.45%	1261.18	10.35%	92.45%	7.55%
Singapore	93	11.80%	1634.54	13.42%	92.47%	7.53%
Russia	74	9.39%	2092.46	17.18%	87.84%	12.16%
Switzerland	55	6.98%	1086.14	8.92%	96.36%	3.64%
Estonia	26	3.30%	293.74	2.41%	100.00%	0.00%
Hong Kong	19	2.41%	243.32	2.00%	100.00%	0.00%
Canada	18	2.28%	285.4	2.34%	83.33%	16.67%
Netherlands	18	2.28%	83.83	0.69%	88.89%	11.11%
France	12	1.52%	117.78	0.97%	75.00%	25.00%
Germany	12	1.52%	175.89	1.44%	91.67%	8.33%
Australia	11	1.40%	85.1	0.70%	81.82%	18.18%
China	11	1.40%	151.7	1.25%	100.00%	0.00%
Israel	11	1.40%	391.72	3.22%	100.00%	0.00%
Slovenia	11	1.40%	104.4	0.86%	100.00%	0.00%
Other countries	155	19.67%	1403.97	11.52%		
Total	788		12182.32			

Notes: In Panel A, the numbers of completed and failed ICOs are obtained through manually counting ICOs listed on the website www.TokenData.io. It contains ICOs finished between August of 2014 and 31st May 2018. Success is defined as a venture completes its ICO with the total amount of capital raised meeting or exceeding the target amount set ex ante. Failure is defined as a venture fails to raise the target amount of capital set ex ante in an ICO. In panel B, UK includes the United Kingdom and British overseas territories including Bermuda, British Virgin Islands, Cayman Islands, Gibraltar, Guernsey, Isle of Man, and Jersey. Among all 986 ICOs, 788 are registered in a specific country. Country information for each ICO is collected from various ICO-tracking websites including www.TokenMarket.net, www.ICObench.com, www.TrackICO.io, and www.ICODrops.com. Sixty-four countries have registered ICOs. Amount of Capital is in millions of US dollars. Success% and Fail% represent the success and failure rates of ICOs for each country.

We discover that the disclosure of founders' per-sonal information is associated with larger amount of funds raised in ICOs. That is, when a young venture discloses its founders' personal information on educa-tional background, previous work experience, and social networks, it raises a larger amount of capital via an ICO, compared to an otherwise similar firm that does not disclose such information. These results hold when (a) controlling for a country's economic performance, the quality of its legal institutions, Bitcoin price, as well as time fixed effects; and (b) analyzing different measures of personal information individually and collectively. In terms of economic magnitude, consider *Founder*, a dummy variable that equals to one if a firm discloses founders' personal information and zero otherwise, in column 7 of panel A in Exhibit 4. We find that if an average firm changes its status of disclosing founders' information from zero to one, the amount of capital it raises from an ICO would increase by $1.75 million, representing about 11% of the average amount raised in an ICO in our sample (see Exhibit 1).

We also find that disclosing founders' background information on education, work experience, and social networks is positively (negatively), significantly related with the speed of fundraising in an ICO (the total number of days of ICO). With regard to the economic

Exhibit 2
Variable Definitions

Variables	Definition	Source
ICO Characteristics		
Capital	Natural logarithm of the capital an ICO project raised in US dollar	tokendata.ico
Speed	Natural logarithm of total number of days of an ICO event	
Founder	Equals to 1 if the founder and his/her personal details is disclosed and 0 otherwise	linkedin.com
Advisor	Equals to 1 if an ICO has an advisory team and 0 otherwise	TokenMarket.net, ICObench.com,
Whitepaper	Equals to 1 ifa n ICO project has a whitepaper and 0 otherwise	TrackICO.io, ICODrops.com and
Twitter	Equals to 1 if an ICO project has twitter account and 0 otherwise	official websites of ICOs
Telegram	Equals to 1 if an ICO project has telegram account and 0 otherwise	
CSR	Equals to 1 if CSR is mentioned whitepaper and 0 otherwise	White papers and official websites
Founder Characteristics		
Education	Average education level within a founding team	linkedin.com
Business	Number of founders that have business background	
Blockchain	Number of founders that have blockchain working experience	
Technology	Number of founders that have technical background	
Professor	Number of founders that have worked as a professor	
Board	Total number of founders' working experiences as board members	
Connection	Natural logarithm of total LinkedIn connections within a founding team	
Team Characteristics		
Founder size	Number of founders	official websites of ICOs
Mgt team size	Number of management team members	
Advisor size	Number of advisors	
Market Characteristics		
Bitcoin price	Natural logarithm of bitcoin price when ICO ends	coindesk.com
GDP	Natural logarithm of average GDP per capita for each country from 2011 to 2013	worldbank.org
Rule of law	Rule of law index for each country in 2013	theglobaleconomy.com

magnitude of our estimates, consider *Founder* in column 7 of panel B in Exhibit 4. We discover that an average firm with founders' information disclosed would complete its ICO faster by 1.63 days compared to an otherwise similar firm, but without the disclosure of such information. This result is non-trivial, given the median speed in our sample is 31 days (see Exhibit 3).

We next examine how founding team's human capital, measured by the size of the founding team, collective experience, business and technical background, influences firm's success in ICOs. A simple venture evaluation framework suggests that a larger size and various business and technical background of the founding team creates value for ICOs. As suggested by Watson, Stewart, and BarNir (2003), a larger founding team with a diversified background is associated a higher level of specification and more social resources, both considered as important predictors of venture success. On the

other hand, the founding team of a young venture going through ICOs bears some resemblances to a corporate board of directors, where abundant literature show that a larger size is sometimes associated with severe agency problems, more frictions in communication, and poor governance quality (Yermack 1996; Eisenberg, Sundgren, and Wells 1998). Thus, it is unknown *ex ante* that how founders' collective human capital affects the amount raised in an ICO.

We find that the human capital of a founding team is positively, significantly associated with the amount of external finance raised through an ICO. The number of founding members that have business background, previously worked in blockchain and technology industries, have sat on corporate boards, and have larger social networks as measured by the number of connections in LinkedIn all enter the regressions individually with positive coefficients at least at the 5% significance level.

E X H I B I T 3
Summary Statistics

Variable	N	Mean	Std. Dev	Min	p25	p50	p75	Max
Panel A: ICO Characteristics								
Capital (in millions)	715	17.1	66.8	0	1.98	8.12	20	1700
Ln(Capital)	715	15.39	2.02	8.01	14.50	15.91	16.81	18.59
Speed	715	32.50	30.57	1	9	31	42	225
Ln(Speed)	715	2.81	1.47	0	2.20	3.43	3.74	5.42
Founder	715	0.88	0.32	0	1	1	1	1
Whitepaper	715	0.85	0.35	0	1	1	1	1
Twitter	715	0.98	0.15	0	1	1	1	1
Telegram	715	0.88	0.33	0	1	1	1	1
Advisor	715	0.72	0.45	0	0	1	1	1
CSR	715	0.21	0.41	0	0	0	0	1
Panel B: Founder Characteristics								
Education	633	1.19	0.75	0	0.75	1	2	3
Business	633	1.34	0.96	0	1	1	2	6
Blockchain	633	0.21	0.49	0	0	0	0	4
Technology	633	0.88	0.93	0	0	1	1	7
Professor	633	0.03	0.2	0	0	0	0	2
Board	633	0.36	1	0	0	0	0	12
Connection	633	6.69	6.23	0	6.21	6.22	6.91	8.41
Founder size	633	1.91	1.09	1	1	2	3	11
Mgt team size	633	12.43	9.27	0	6	10	15	70
Advisor size	633	5.26	4.66	0	1	5	8	28
Panel C: Market Condition								
Bitcoin price	715	8.65	0.8	5.43	8.39	8.82	9.29	11.99
GDP	715	10.42	0.77	6.71	9.8	10.64	10.85	11.99
Rule of Law	715	1.14	0.9	−1.38	0.98	1.56	1.71	1.9

Exploring the extensive margin, the number of management team members and the presence of an advisory board are both positively, significantly (at the 1% level) associated with the total amount of capital raised in an ICO. These results are robust when (a) controlling for a country's wealth, the quality of its legal system, Bitcoin price, as well as time fixed effects; and (b) analyzing different measures individually and collectively. The economic magnitude of these estimates is large. Consider *Business*, which measures the number of founding members with business background. If an average business venture were to increase the number of founding partners with business experience by 1 (the standard deviation of *Business* is 0.96 in our sample), the total amount of capital raised via ICO would increase by $1.30 million (column 9 of panel A in Exhibit 5), which is around 8% of the average amount raised in an ICO in our sample.

We also discover that founders' collective human capital is positively, significantly related with the speed of fundraising in an ICO. That is, when a start-up has more founding members with business, blockchain, and technology experience, corporate board background, and larger social networks, it completes its ICO faster, compared to an otherwise similar firm but has less such founding members. In terms of the economic size of our estimates, consider *Business* in column 9 panel B of Exhibit 5. We find if a young venture has 1 more founding member with business background, it would complete its fundraising faster by 1.2 days, representing a 4% increase in speed when evaluated at the median.

One potential threat to the validity of our results is sample selection bias. Our sample consists of 788 successful ICOs, but only 715 and 632 choose to disclose the information on ICO characteristics and founding team's traits, respectively. This could potentially bias our estimates if (a) ventures that choose to disclose this information are mainly those that eventually raise more capital or complete their ICOs in a relatively shorter period of time; (b)

E X H I B I T   4
ICO Characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Dependent Variable is Ln(Capital)							
Founder	0.997***						0.562*
	(0.000)						(0.061)
Advisor		0.993***					0.762***
		(0.000)					(0.002)
Whitepaper			0.770**				0.480
			(0.018)				(0.129)
Twitter				0.979**			0.524
				(0.026)			(0.153)
Telegram					0.960***		0.674***
					(0.000)		(0.004)
CSR						0.468***	0.278*
						(0.002)	(0.084)
GDP	0.317	0.280	0.381**	0.342*	0.285	0.346*	0.261
	(0.102)	(0.119)	(0.039)	(0.067)	(0.158)	(0.060)	(0.155)
Rule of law	0.117	0.157	0.0999	0.123	0.161	0.122	0.155
	(0.483)	(0.273)	(0.519)	(0.438)	(0.359)	(0.428)	(0.304)
Bitcoin price	0.648***	0.539**	0.633***	0.668***	0.602**	0.672***	0.585***
	(0.009)	(0.015)	(0.009)	(0.007)	(0.014)	(0.006)	(0.006)
Constant	4.286*	5.320**	3.942*	3.892*	4.893**	4.804**	3.230
	(0.068)	(0.015)	(0.060)	(0.083)	(0.040)	(0.030)	(0.125)
Cluster	Country	Country	Country	Country	Country	Country	Country
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	715	715	715	715	715	715	715
R-Squared	0.169	0.187	0.161	0.151	0.166	0.154	0.224
Panel B: Dependent Variable is Ln(Speed)							
Founder	−0.616***						−0.497***
	(0.000)						(0.000)
Advisor		−0.431***					−0.325**
		(0.003)					(0.015)
White paper			−0.234**				−0.0946
			(0.049)				(0.446)
Twitter				−0.463**			−0.360
				(0.029)			(0.162)
Telegram					−0.0173		0.145
					(0.918)		(0.408)
CSR						−0.239*	−0.176
						(0.070)	(0.195)
GDP	−0.314*	−0.303*	−0.342**	−0.330**	−0.329**	−0.332**	−0.309*
	(0.056)	(0.055)	(0.034)	(0.039)	(0.042)	(0.034)	(0.050)
Rule of law	0.0220	0.00350	0.0252	0.0185	0.0173	0.0190	0.0200
	(0.903)	(0.983)	(0.884)	(0.914)	(0.921)	(0.909)	(0.903)
Bitcoin price	−0.0897	−0.0401	−0.0810	−0.0973	−0.0808	−0.100	−0.0882
	(0.640)	(0.843)	(0.673)	(0.623)	(0.686)	(0.598)	(0.652)
Constant	8.022***	7.430***	7.883***	8.095***	7.546***	7.674***	8.484***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

(continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cluster	Country	Country	Country	Country	Country	Country	Country
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	715	715	715	715	715	715	715
R-Squared	0.100	0.098	0.086	0.085	0.083	0.087	0.114

Notes: The sample consists of 715 ICOs. The dependent variable in panel A is Ln(Capital), which is the natural logarithm of the total amount of capital raised in an ICO; the dependent variable in panel B is Ln(Speed), which is the natural logarithm of the total number of days of an ICO event. Column (1) to (6) present the results when ICO characteristics are examined separately and column (7) shows the results when all ICO characteristics are assessed together. The control variables include GDP per capita, Bitcoin price, and Rule of Law. We also add quarterly time fixed effects in all equations. All variables are defined in the main text and listed in Exhibit 2. Robust standard errors are clustered at country level. P-values are in the parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

ventures that do not disclosure such information are those who raise smaller amount of capital in ICOs and complete their fundraising relatively slowly; or (c) both. To mitigate this concern, we conduct a Heckman (1979) procedure to correct our sample (Momtaz 2018a). Regression analyses with the corrected sample confirm our initial results.

First, this study contributes to a nascent literature that examines the link between issuer characteristics and measures of successful ICOs. Momtaz (2018a, c) examines how CEO's emotion and loyalty shape a successful ICO. Blaseg (2018) investigates whether the disclosure of high-quality source code increases the probability of listing on a public exchange following a token sale. Howell, Niessner, and Yermack (2018) show that the liquidity and trading volume are higher following an ICO when issuers signal high project quality and commitment to the project. This article is distinct from and complements these studies in examining founding team's collective characteristics. We find that the team's characteristics are important factors shaping a successful ICO.

This article also relates to a rapidly growing literature that studies the economics of digital currencies and blockchain (Harvey 2016; Catalini and Gans 2016; Cong, He, and Zheng 2017). Yermack (2017) provides one of the first comprehensive description of blockchain and its implications for corporate governance. Cong, Li, and Wang (2018) proposes a theoretical framework for token valuation. Our work complements recent empirical literature that examine ICOs (Momtaz 2018b, d, e; Drobetz, Momtaz, and Schröder 2018; Blaseg 2018; An, Hou and Liu, 2018; Howell, Niessner, and Yermack 2018) To our knowledge, ours is the only one that focuses on how founding team's characteristics influence the success of an ICO. It is also unique in its use of a large hand-collected dataset.

Lastly, this article speaks to the broader entrepreneurial finance literature (Kaplan, Sensoy, and Strömberg 2009; Mollick 2014; Bernstein, Korteweg, and Laws 2017). ICOs bear many resemblances to crowdfunding, private equity, and venture capital, where a large body of literature assess the link between founders characteristic and firm performance. This article examines an innovative financing vehicle for young ventures and start-ups, highlighting that founders' collective human capital is an important factor shaping the success of external fund-raising.

The rest of the article is organized as follows. The next section provides a theoretical background on ICOs and entrepreneurial finance; the third section presents the data; the fourth section discusses the model and results; and final section concludes.

ICOS AND ENTREPRENEURIAL FINANCE

Initial coin offerings (ICOs) is a new financing instrument that allows start-ups to sell blockchain-based digital tokens for capital on the Internet. Momtaz (2018b) provides interested readers a comprehensive introduction on ICOs. This section, on the other hand, emphasizes some of its advantages over traditional financing channels for young ventures and discusses its implication for entrepreneurial finance.

Challenges in Traditional Entrepreneurial Finance

Asymmetric information and moral hazards are two of the most widely recognized impediments to traditional entrepreneurial finance (Hall and Lerner 2010;

Howell, Niessner, and Yermack 2018; Momtaz 2018a). These frictions limit most arms–length retail investment in young ventures to only those who share physical proximity to and personal connections with venture investors (Chen, et al. 2010). As documented in Howell, Niessner, and Yermack (2018), fundraising for prospective business founders who are located outside major entrepreneurial hubs, such as Silicon Valley in the United States, or who lack personal connections with venture investors is very difficult, if not impossible. Developing countries with

Exhibit 5
Founder Characteristics

Panel A: Dependent Variable is Ln(Capital)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Education	0.170*								0.094
	(0.089)								(0.370)
Business		0.322***							0.261***
		(0.000)							(0.009)
Blockchain			0.282**						0.083
			(0.049)						(0.497)
Technology				0.143**					0.066
				(0.037)					(0.406)
Professor					−0.109				−0.360
					(0.784)				(0.446)
Board						0.120***			0.038
						(0.010)			(0.324)
Connection							0.162***		0.032
							(0.005)		(0.423)
Founder size								0.101	−0.111
								(0.101)	(0.214)
Mgt team size								0.035***	0.033***
								(0.000)	(0.000)
Advisor size								0.062***	0.055***
								(0.000)	(0.006)
White paper	0.412	0.420	0.414	0.379	0.408	0.405	0.392	0.381	0.388
	(0.142)	(0.110)	(0.143)	(0.170)	(0.148)	(0.163)	(0.141)	(0.159)	(0.114)
Twitter	0.393	0.468*	0.435*	0.452	0.407	0.418	0.344	0.259	0.321
	(0.147)	(0.092)	(0.092)	(0.102)	(0.118)	(0.122)	(0.184)	(0.214)	(0.124)
Telegram	0.721**	0.639**	0.712**	0.726**	0.733**	0.726**	0.697**	0.581**	0.529*
	(0.016)	(0.025)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.033)	(0.051)
CSR	0.262*	0.249	0.286*	0.283*	0.287*	0.267*	0.305*	0.213	0.213
	(0.090)	(0.118)	(0.076)	(0.073)	(0.071)	(0.096)	(0.054)	(0.202)	(0.194)
GDP	0.349**	0.324*	0.329*	0.313*	0.347**	0.340**	0.335*	0.301*	0.279*
	(0.046)	(0.066)	(0.054)	(0.077)	(0.042)	(0.045)	(0.057)	(0.070)	(0.087)
Rule of law	0.0956	0.0943	0.0937	0.106	0.0963	0.0819	0.0744	0.0983	0.0915
	(0.528)	(0.561)	(0.531)	(0.480)	(0.515)	(0.585)	(0.624)	(0.460)	(0.484)
Bitcoin price	0.689**	0.705**	0.680**	0.685**	0.669**	0.669**	0.693**	0.586**	0.582**
	(0.016)	(0.013)	(0.012)	(0.015)	(0.014)	(0.013)	(0.012)	(0.019)	(0.029)
Constant	3.054	2.704	3.427	3.409	3.309	3.407*	2.199	2.644	2.954
	(0.156)	(0.199)	(0.109)	(0.126)	(0.124)	(0.098)	(0.301)	(0.180)	(0.175)
Cluster	Country	Country	Country	Country	Country	Country	Country	Country	Country
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	632	632	632	632	632	632	632	632	632
R-Squared	0.156	0.178	0.157	0.156	0.152	0.156	0.164	0.217	0.232

(continued)

Founder Characteristics

Panel B: Dependent Variable is Ln(Speed)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Education	−0.21***								−0.10**
	(0.000)								(0.035)
Business		−0.14***							−0.20***
		(0.006)							(0.002)
Blockchain			−0.247*						−0.187
			(0.055)						(0.204)
Technology				−0.24***					−0.35***
				(0.000)					(0.005)
Professor					0.0190				0.154
					(0.932)				(0.372)
Board						−0.0138			0.00205
						(0.783)			(0.970)
Connection							−0.11**		−0.0324
							(0.031)		(0.534)
Founder size								0.0208	0.35***
								(0.674)	(0.001)
Mgt size								−0.01	−0.01
								(0.223)	(0.253)
Advisor size								−0.05***	−0.04***
								(0.005)	(0.004)
Whitepaper	−0.222	−0.221	−0.222	−0.170	−0.216	−0.215	−0.206	−0.217	−0.167
	(0.132)	(0.132)	(0.169)	(0.263)	(0.157)	(0.157)	(0.147)	(0.147)	(0.328)
Twitter	−0.438**	−0.48**	−0.48**	−0.53**	−0.46**	−0.46**	−0.41**	−0.361	−0.492*
	(0.045)	(0.014)	(0.013)	(0.031)	(0.031)	(0.032)	(0.050)	(0.105)	(0.061)
Telegram	0.166	0.194	0.170	0.162	0.153	0.154	0.175	0.208	0.250
	(0.455)	(0.393)	(0.426)	(0.467)	(0.501)	(0.500)	(0.421)	(0.364)	(0.239)
CSR	−0.184	−0.196	−0.213	−0.209	−0.212	−0.209	−0.225	−0.182	−0.200
	(0.174)	(0.179)	(0.136)	(0.137)	(0.140)	(0.148)	(0.120)	(0.211)	(0.160)
GDP	−0.367**	−0.35**	−0.35**	−0.31**	−0.36**	−0.36**	−0.36**	−0.35**	−0.26*
	(0.023)	(0.036)	(0.029)	(0.048)	(0.026)	(0.026)	(0.030)	(0.021)	(0.069)
Rule of law	0.0535	0.0515	0.0539	0.0374	0.0500	0.0515	0.0653	0.0413	0.0159
	(0.748)	(0.768)	(0.742)	(0.818)	(0.763)	(0.756)	(0.695)	(0.785)	(0.909)
Bitcoin price	−0.119	−0.115	−0.106	−0.117	−0.102	−0.102	−0.114	−0.0442	−0.0519
	(0.575)	(0.573)	(0.612)	(0.568)	(0.636)	(0.620)	(0.582)	(0.842)	(0.809)
Constant	8.78***	8.74***	8.36***	8.28***	8.47***	8.46***	9.19***	8.24***	7.10***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cluster	Country	Country	Country	Country	Country	Country	Country	Country	Country
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	632	632	632	632	632	632	632	632	632
R-Squared	0.101	0.098	0.096	0.111	0.090	0.090	0.098	0.113	0.165

Notes: The sample consists of 632 ICOs with non-missing founders' characteristics. The dependent variable in panel A is Ln(Capital), which is the natural logarithm of the total amount of capital raised in an ICO; the dependent variable in panel B is Ln(Speed), which is the natural logarithm of the total number of days of an ICO event. Column (1) to (8) present the results when founders' characteristics are examined separately and column (9) shows the results when all founders' characteristics are assessed together. The control variables include GDP per capita, Bitcoin price, and Rule of Law, as well as all ICO characteristics examined in Exhibit 4. We also add quarterly time fixed effects in all equations. All variables are defined in the main text and listed in Exhibit 2. Robust standard errors are clustered at country level. P-values are in the parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

weak legal institutions face even more severe challenges. A substantial proportion of private business needs to rely on informal finance with extremely high interest rates as the cost of asymmetric information (Hall and Lerner 2010; Allen, Qian, and Qian 2005; Banerjee and Duflo 2011). Agency problems only exacerbate this issue. Delegating controlling rights to unknown agents are found to be extremely hard in both developing and developed countries (La Porta et al. 1999). These frictions often leave high-reward new ventures under- or unfunded and individuals with risky preferences few investing opportunities.

Advantages of ICOs

ICOs are an important innovation in entrepreneurial finance that have several advantages over traditional financing channels, particularly in mitigating moral hazards and asymmetric information (Momtaz 2018a, b; Howell, Niessner, and Yermack 2018). First, since token sales are based on blockchain technology, issuers usually have to establish immutable, non-negotiable governance terms (Howell, Niessner, and Yermack 2018). These terms are available to investors *ex ante* and impossible to change *ex post*, signaling strong commitment of the founding team on venture governance. Immutable governance terms and strong commitment of the founding team restrict moral hazard problems, since the management team has little room to benefit themselves at the expense of investors.

Second, ICOs use and promote decentralized networks, in which values generated in the network in theory would accrue to its token holders, instead of the intermediaries in traditional networks. That is, an ICO can compensate initial investors and developers without giving them more control of the network than any other token holders (Howell, Niessner, and Yermack 2018). This helps alleviate the concern of moral hazard in traditional networks, where investors or customers worry the first-comers and developers extract rents from the network.

Third, through selling blockchain-based digital tokens on the Internet, young ventures can attract a wide range of investors including future customers (Momtaz 2018b; Catalini and Gans 2016; Li and Mann 2018). This significantly reduces information asymmetries that have traditionally impeded entrepreneurial finance: individuals who wish to invest in high risk, high reward ventures have little access to such information, and prospective venture founders, in the meantime, have few connections to such investors. Raising capital on the Internet via blockchain technology connects such investors with prospective business founders, thus reducing information frictions substantially.

Near zero transaction costs and rapid liquidity are another two most cited benefits of ICOs (Momtaz 2018b; Howell, Niessner, and Yermack 2018). For a comprehensive discussion on the advantages of ICOs, please refer to Momtaz (2018b) and Howell, Niessner, and Yermack (2018).

ICOs are an important innovation in entrepreneurial finance. The sale of blockchain-based digital tokens provides security and credible commitments to potential investors and customers. It also permits a broader range of individuals, who may be excluded from investing in traditional financing instruments, to invest in high-risk, high-return venture projects, while enabling prospective venture founders who lack access to traditional networks, access to investors to raise external finance.

DATA

In this section, we first describe our sample and data in detail. We then define the key variables in our estimations followed by the introduction of the empirical models.

Data Source and Sample

Our sample consists 753 completed and 233 failed ICOs listed on TokenData between August 2014 and May 2018. Information on ICO characteristics and the founding team's profile are gathered from the official websites, whitepapers, and social platforms including Twitter and Telegram. To complement and cross-check the information from our main data source, we also consult other popular digital token websites such as TokenMarket.net, ICObench.com, TrackICO.io, and ICODrops.com. To obtain information on the founding team, we rely on LinkedIn, a professional employment-oriented network. In total, we have 632 ICOs with complete information on founder's characteristics. We show the within sample distribution of ICOs across countries in Exhibit 1. In Exhibit 2, we provide definition and source of each variable. Summary statistics are presented in Exhibit 3.

Measures of ICO Characteristics

Our main outcome variable, *Ln(Capital)*, is the natural logarithm of the amount of total capital raised in an ICO. This measure of ICO success is widely used in the literature and is the most direct measure of firm access to external finance through an ICO (Mollick 2014; Cumming et al. 2015; Fisch 2018). We also evaluate another aspect of ICO success, *Speed*, which is the natural logarithm of the total number of days of an ICO.[2] It measures how fast a young venture can complete its fundraising, a reflection of venture's quality. *Founder*, is a dummy variable that equals to one if the founding team's background information are public available and zero otherwise. We focus on three aspects of founders' background: education, work experience, and social network, which we discuss in detail later in this section. *Advisor*, and *Whitepaper* are dummy variables that equal to one if the founding team has advisors, and if the whitepaper is publicly accessible. Corporate social responsibility (CSR) is found to be an important factor shaping firm's performance and valuation. For example, Mackey, Mackey, and Barney (2007) find that managers in publicly traded firms might fund socially responsible activities that do not maximize the present value of their firm's future cash flows, yet still maximize the market value of the firm. We therefore include a dummy variable, *CSR*, which equals to one if it is mentioned in the whitepaper, respectively, and zero otherwise. *Twitter* and *Telegram* are two dummy variables that measure founder's social networks. In particular, *Twitter* and *Telegram* equal to one if the founder has a Twitter/Telegram account, and zero otherwise. The difference between these two variable is that *Twitter* acts as the role of passing on dynamic information to the public, enabling stakeholders know the process and state of development of the new venture, while *Telegram*, a cloud-based platform that permits up to one hundred thousand members chatting and broadcasting, provides a safe environment where founding team members can communicate with investors directly (Howell, Niessner, and Yermack 2018). Drawing some parallels between ICOs and traditional entrepreneurial finance instruments, i.e., crowdfunding, these are important factors that influence fundraising outcomes (Mollick 2014; Amsden and Schweizer 2018).

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[2] We thank one of the referees for this point.

Measures of Founder Characteristics

Our measures of founder characteristics include three broad categories: educational background, work experience and social networks. For education background, we use *Education*, which is calculated as the average education level of a founding team, with 1 corresponding to "lower than bachelor," 2 for "bachelor," 3 for "master," and 4 for "doctor" (Watson, Stewart, and BarNir 2003). For founder's experience, we follow Howell, Niessner, and Yermack (2018) and develop five sub-measures: *Business*, *Blockchain*, *Technology*, *Professor*, and *Board*. These measures are calculated as the total number of founding members who have such experience. For example, *Business* is the number of founders who have worked in the business industries, while *Blockchain* measures the total number of founding members with blockchain technology experience. As shown in Exhibit 3, there are substantial variations in these measures. Consider *Technology*. It ranges from 0 to 7, indicating that the total number of people with technology industry experience in a founding team ranges from 0 to 7 people. The median value is 1 in our sample. This suggests that an average founding team normally has one person with experience from technology industry. We measure founders' social network using *Connection*, a measure calculated as the natural logarithm of the cumulative LinkedIn connections of a founding team. It ranges from 0 to 8.41, indicating that the cumulative LinkedIn connections of a founding team ranges from 1 to 4,492. The median value of this measure is 6.22.

We also use three measures of the extensive margins of a founding team's human capital: *Founder size*, *Management team size*, and *Advisor size*. *Founder size* is calculated as the total number of founding members in a founding team. It ranges from 1 to 11 in our sample, with a median value of 2. *Management team size* is the total number of people in the management team. It has considerable cross-project variations in our sample, ranges from zero to 70 people. Lastly, *Advisor size* is a measure of the total number of advisors to a founding team. It ranges to 0 to 28, with a median value of 5 in our sample.

Other Control Variables

In all our empirical specifications, we control for country's gross domestic product (GDP) per capita,

adjusted by PPP (purchasing power parity) between 2011 and 2013. The quality of the residing country's legal institutions is recognized as an important factor shaping financial development (La Porta et al. 1998, 1999; Levine 2005). In particular, legal systems differ in how effectively they safeguard private property from encroachments by the state or others, enforce contracts, resolve disputes, and adapt to support the evolving demands of firms and individuals in a dynamic economy. In turn, a large body of empirical work confirms that these legal system differences impact the functioning of financial systems and the financing of firms. We therefore use the *Rule of Law* index, a comprehensive quantitative assessment of to what extent a country adheres to its law and regulations from eight dimensions including limited government powers, absence of corruption, order and security, fundamental rights, open government, regulatory enforcement, civil justice, and criminal justice, obtained from the World Justice Project 2013 version. We also control for the market condition and people's attitude toward the overall token market, using *Bitcoin price*, which is the price of bitcoin when a venture ends its ICO.

FOUNDER CHARACTERISTICS AND ICO OUTCOMES

ICO Characteristics and Outcomes

In this section, we use cross projects comparisons to motivate our examination of the impact of the founder characteristics on the total amount raised via an ICO. We begin with the following ordinary least squares (OLS) regressions:

$$ICO\ Outcomes_i = \beta_0 + \beta_1 ICO\ Characteristics_i$$
$$+ \beta_2 Controls + \Psi + \varepsilon_i \qquad (1)$$

where the dependent variable is either *Capital_i* in panel A, measured as the natural logarithm of total amount of capital raised in ICO, *i*, or *Speed_i* in panel B, calculated as the natural logarithm of the number of days in an ICO. The key explanatory variables are *ICO Characteristics_i* which is either *Founder*, *Advisor*, *Whitepaper*, *Twitter*, *Telegram*, *CSR* in model (1)–(6) and all together in model (7) of Exhibit 4. *Controls* include *GDP*, *Rule of law*, and *Bitcoin price*, all of which are discussed in previous section. We also include a time fixed effects,

Ψ, measured quarterly, in all our models. We report heteroskedasticity consistent p-values, where the standard errors are clustered at the country level.

As shown in Exhibit 4 panel A, ICO characteristics are positively, significantly associated with the total amount of funding raised in an ICO. *Founder*, *Advisor*, *Whitepaper*, *Twitter*, *Telegram*, and *CSR* all enter positively and significantly in the regressions when assessed individually. With respect to the economic magnitude, consider *Founder* in column (1). If a venture were to change its disclosure status of its founders' background information, either education level, work experience, or social network, the total amount of capital raised through an ICO would increase by about $2.71 million. This is large, given the average ICO in our sample raises about $12 million. Take another example, *Telegram*. If a young venture discloses its founders' Telegram account to public, it would raise $2.70 million more capital in an ICO, compared to an otherwise similar venture but fails to disclose such information.

When evaluating *Speed* of fundraising, we find that all ICO characteristics again enter the regressions negatively and significantly as presented in panel B of Exhibit 4, except Telegram. In terms of economic magnitude, consider *Founder* in column 1. This is consistent with our hypothesis since we measure the speed of fundraising as the natural logarithm of the number of days of an ICO. A start-up with disclosure of founders' background information would complete its fundraising faster by 1.85 days, compared to an otherwise similar firm but without disclosing such information. This represents a 6% increase in speed of fundraising, measured at the median value.

In column (7) of Exhibit 4 panel A, where we examine the effects of all ICO characteristics together on total capital raised, *Founder*, *Advisor*, *Whitepaper*, *Telegram*, and *CSR* remain positive and statistically significant, despite that multicollinearity potentially yield larger standard errors for our estimates. This is reassuring since ventures with high disclosure quality usually disclose many of the ICO characteristics and vice versa. In terms of economic interpretation of the results, consider, again, *Founder*. If a young venture discloses its founders' background information, either education level, work experience, or social network, it would raise $1.75 million more capital in an ICO, compared to an otherwise similar venture but fails to disclose such information. When evaluating the speed of fundraising in

panel B, we find *Founder* and *Advisor* are still important and statistically significant factors influencing the speed of ICOs. In terms of its economic size, if an average firm discloses founders' background information on education, working experience, and social network, it would complete its ICO faster by 1.63 days, compared to an otherwise similar firm without the disclosure of such information. This result is large, considering the median speed in our sample is 31 days.

Founder Characteristics and ICO Outcomes

We next turn to the question of whether founders' characteristics influence ICO outcomes. We use the following OLS regression specification that exploits cross-venture variations in founding team's characteristics:

$$ICO\ Outcomes_i = \beta_0 + \beta_1 Founder\ Characteristics_i$$
$$+ \beta_2 Controls + \Psi + \varepsilon_i \quad (2)$$

where the dependent variable is either *Capital_i* in panel A, measured as the natural logarithm of total amount of capital raised in ICO, *i*, or *Speed_i* in panel B, calculated as the natural logarithm of the number of days in an ICO. The key explanatory variables are *Founder Characteristics_i* which is either *Education Business, Blockchain, Technology, Professor, Board,* and *Connection* in model (1)–(7), *Founder size, Management team size,* and *Advisor size* in model (8), and all together in model (9) of Exhibit 5. *Controls* include all the measures of ICO characteristics, such as *Founder, Advisor, Whitepaper, Twitter, Telegram,* and *CSR,* as well as *GDP, Rule of law,* and *Bitcoin price,* all of which are discussed in previous section. We also include a time fixed effects, measured quarterly, in all our models. We report heteroskedasticity consistent p-values, and our standard errors are clustered at the country level.

As shown in panel A of Exhibit 5, *Education, Business, Blockchain, Technology, Board,* and *Connection* all enter the regressions positively and significantly at least at 5% significance level except *Education.* This indicates that founding team's human capital has a positive impact on the total amount of capital raised via ICOs, a result consistent with the evidence in entrepreneurial finance literature (Mollick 2014; Cumming et al. 2005; Fisch 2018). With respect to the economic magnitude, consider *Business.* If the founding team of a young venture has an additional member with experience in business,

it would raise $1.40 million more capital in an ICO, compared to an otherwise similar venture. This effect is large, given the average amount of capital raised in an ICO is about $13 million in our sample.

Column (8) in Exhibit 5 tests whether the collective human capital of the founding team, at the extensive margin, influences the results of an ICO. Both *Advisor size* and *Management team size* enter the regression positively and significantly at 1% significance level, indicating that the quality of the collective human capital of the founding team is an important factor shaping firm access to external finance. In terms of the economic magnitude, consider *Management team size.* If the founding team of a young venture has an additional member in its management team, it would raise $1.03 million more capital in an ICO, compared to an otherwise similar venture. This effect is sizable, representing 7.7% of the average amount of capital raised in an ICO in our sample. When included with all founding team characteristics together in column (9), the size and statistical magnitude of *Advisor size* and *Management team size* do not change, indicating a robust link between the founding team's human capital and the ICO outcomes.

Panel B of Exhibit 5 presents the results when we evaluate the effects of founders' characteristics on the speed of fundraising. We find that *Education, Business, Blockchain, Technology, Connection,* and *Advisory size* all enter the regressions negatively and significantly at least at 5% significance level except *Blockchain.* This indicates that disclosure of founders' information is an important factor shaping the success of young venture's fundraising. To interpret the economic magnitude of our estimates, consider *Education.* If founding team's average education level increases from "lower than bachelor" (0) to "master" (2), it would complete its ICO faster by 1.52 days, a 5% increase in ICO speed.

Column (9) in Exhibit 5 shows the results when we include all the founders' characteristics together. Despite large standard errors due to multicollinearity among the measures, *Business, Advisor size,* and *Management team size* remain positive and statistically significant in panel A, and *Education, Business, Technology, Founder size,* and *Advisory size* remain statistically significant in panel B. The economic size of these coefficients changes little, adding confidence to our estimations. Re-interpreting the coefficients on *Business* in panel A, for example, if

the founding team of a young venture has an additional member with experience in business, it would raise $1.30 million more capital in an ICO, compared to an otherwise similar venture.

Address Sample Selection Bias

One potential concern on the validity of our estimates arises from sample election bias. Our initial sample consists 788 succeeded ICOs, but only 715 and 632 choose to disclose the information on ICO characteristics and founding team's traits, respectively. This could potentially confound our estimates if (a) ventures that choose to disclose this information are mainly those that eventually raise more capital or complete their ICOs in a relatively shorter period of time; (b) ventures that do not disclosure such information are those who raise smaller amount of capital in ICOs and complete their fundraising relatively slowly; or (c) both. To mitigate this concern, we conduct a Heckman (1979) procedure to correct our sample.

Following Momtaz (2018a), we use the profile of its founding team, *Advisory size*, *Twitter*, *Telegram*, and its ICO profile, *Whitepaper* to estimate the probability that an ICO chooses to disclose the information on founders' background. We then add the inverse Mills ratios derived from this computation as a control variable in our main regressions.

Our results hold using the Heckman (1979) correction. As shown in Exhibit 6, we find that *Education*, *Business*, *Management team size*, and *Advisory team size* remain statistically significant with expected signs when evaluating total capital raised. The economic magnitude remains large. Consider *Business* in column (1). If the founding team of a young venture has an additional member with experience in business, it would raise about $1.3 million more capital in an ICO, compared to an otherwise similar venture. This effect is large, considering the average amount of capital raised in an ICO is about $13 million in our sample. When examining fundraising speed, *Education*, *Business*, *Technology*, *Founder size*, and *Advisory size* all enter the equations negatively and significantly, indicating that our results are not fully driven by the potential sample selection bias. Interpreting the coefficient in an economically meaningful way, consider, again, *Business* in column (2). It shows that a start-up with an additional member with business background would complete its fundraising faster by

1.22 days, compared to an otherwise similar firm. This represents a 4% increase in speed of fundraising, measured at the median value.

CONCLUSIONS

This study extends previous research on the role of founder characteristics played in the process of external financing through ICOs. As a new channel of entrepreneurial finance, ICOs became very popular in a short time. While similarities exist between ICOs and traditional external financing methods, there are many important advantages of ICOs. For example,

E X H I B I T 6
Founder Characteristics with Correction for Selection Bias

	(1) Ln(Capital)	(2) Ln(Speed)
Education	0.0906	−0.101**
	(0.393)	(0.040)
Business	0.255***	−0.201***
	(0.008)	(0.003)
Blockchain	0.0809	−0.186
	(0.519)	(0.204)
Technology	0.0675	−0.354***
	(0.403)	(0.005)
Professor	−0.326	0.139
	(0.495)	(0.411)
Board	0.0383	0.00201
	(0.314)	(0.971)
Connection	0.0295	−0.0314
	(0.440)	(0.522)
Founder size	−0.104	0.349***
	(0.224)	(0.001)
Mgt team size	0.0335***	−0.00592
	(0.000)	(0.242)
Advisor size	0.0350**	−0.0338**
	(0.014)	(0.041)
White paper	0.238	−0.103
	(0.220)	(0.548)
Twitter	0.188	−0.435
	(0.384)	(0.143)
Telegram	0.319	0.340*
	(0.201)	(0.075)
CSR	0.210	−0.198
	(0.209)	(0.167)
GDP	0.276*	−0.258*
	(0.083)	(0.070)

(continued)

Eᴏ xᴢ ʜ ɪ ʙ ɪ ᴛ 6 *(continued)*
Founder Characteristics with Correction for Selection Bias

	(1) Ln(Capital)	(2) Ln(Speed)
Rule of law	0.0929	0.0153
	(0.462)	(0.912)
Bitcoin price	0.558**	−0.0417
	(0.033)	(0.848)
Lambda	−1.373	0.588
	(0.153)	(0.191)
Constant	3.872*	6.703***
	(0.077)	(0.000)
Cluster	Country	Country
Quarter FE	Yes	Yes
Observation	632	632
R-Squared	0.237	0.166

Notes: This Exhibit reproduces the results shown in Exhibit 5 with correction for selection bias using Heckman two-stage method. The dependent variable is Ln(Capital) in column (1) and Ln(Speed) in column (2). Both variables are defined in Exhibit 2. Column (1) to (8) present the results when founders' characteristics are examined separately and column (9) shows the results when all founders' characteristics are assessed together. The control variables include GDP per capita, Bitcoin price, and Rule of Law, as well as all ICO characteristics examined in Exhibit 4. We also add quarterly time fixed effects in all equations. All variables are defined in the main text and listed in Exhibit 2. Robust standard errors are clustered at country level. P-values are in the parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level, respectively.

since token sales are based on blockchain technology, issuers usually must establish immutable, non–negotiable governance terms (Howell, Niessner, and Yermack 2018). These terms are impossible to change *ex post*, therefore restricting moral hazard problems that have traditionally plagued entrepreneurial finance.

Based on a unique sample of 788 hand-collected successful ICOs, we find the disclosure of the founding team information and its collective human capital are positively associated with the total amount of capital raised in ICOs and the fundraising speed. We further show that entrepreneurial firms managed by founders with business background, technology background and a broader social network raise larger amount of capital via ICOs and in a shorter period of time. The findings imply that the disclosure of founders' background information and founding team's collective human capital are very important for the capital raising in the financial markets.

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