Trust, regulation, and initial coin offerings: An international perspective

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ABSTRACT

Investors and policymakers still have little knowledge of Initial Coin Offerings' (ICOs) dynamics as a funding mechanism. It is unclear what factors determine their international diffusion, the amount of capital raised and even the market perception post-ICO. Based on 2,205 ICOs from 105 countries between 2015 and 2018, we draw on institutional theory to provide evidence that, in a context of high information asymmetry and regulatory uncertainty, a country's institutional strength has a positive and significant effect on the number of ICOs, their probability of success, the amount raised and the token price volatility. We observe that this relationship is particularly relevant for countries with no or light regulations concerning ICOs. This indicates that, to some extent, institutions substitute for the regulatory void surrounding ICOs. The crux of our results is that despite the decentralization and disintermediation features of ICOs, a country's strong institutions support the development of ICOs, send a signal of trustworthiness to investors, and reduce the return volatility associated with ICOs.

KEYWORDS: Initial coin offerings, institutional theory, information asymmetry, regulation.

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1 Introduction

Initial Coin Offerings (ICOs) are the latest innovation in entrepreneurial finance to raise capital. These ICOs generally issue a token (or cryptocurrency), which can serve as a means of payment for the entrepreneurs' service. However, it remains to be understood the factors that determine the amount entrepreneurs can raise from the crowd of investors. Fisch [2019] shows that ICOs can differentiate themselves by signaling their technical capabilities, and that these ICOs can raise more funds. Differentiation through signaling provides one avenue for investors to form their valuations on coin offerings. However, ICOs are generally not subject to the same stringent legal and financial restrictions as traditional securities, such that the provided signals may not be verifiable by investors. As shown by Arrow [1973], economists have already recognized that trust matters when selecting a security to invest in [Carlin, Dorobantu, and Viswanathan, 2009; Guiso, Sapienza, and Zingales, 2008]. These studies point out that trust may substitute regulation in a financial market. In this vein, this paper argues that trust, as proxied by a country's tradition for law and order, serves as a lever for investors to partake and invest in ICOs.

A vast body of theoretical and empirical work has shown the importance of government regulation in economic growth [see e.g., La Porta, Lopez-de Silanes, and Shleifer, 2006; La Porta, Lopez-de

Silanes, Shleifer, and Vishny, 1998]. This can be resonated in the role of regulations in decreasing the potential fraud and opacity of the security issuer. However, even when government regulation is weak, proper economic trading may occur because investors infer the trustworthiness of the issuer through other means. For example, Knack and Keefer [1997] find that Scandinavian countries have substantial growth despite the fact that their laws provide significantly less investor protection compared to common-law countries, and attribute this to trust and civic norms. In addition, Carlin et al. [2009] and Aghion, Algan, and Shleifer [2010] theoretically show that regulations and trust may ultimately serve as substitutes.

Specific to the ICO setting, there exists an absence of regulation. Individual investors must therefore trust the claims of the entrepreneurs in purchasing their cryptocurrencies. Although the results of Fisch [2019] indicate that ICOs can attract more investors by signaling their technical capacity, with an absence of regulation, the quality of the information provided though the signaling may not be truthful. For example, in 2018 the SEC stopped the ICO of 'AriseCoin' on the grounds of false claims in the provided information [SEC, 2018].[1] For this reason, investors must infer the trustworthiness of the ICO issuers through alternative means. We suggest that the country where the ICO originates from establishes the basis of these inferences by which the choices of investors are affected. We posit that the ICOs, which originate from countries with better establishment of law and order are perceived to be more trustworthy, and are therefore able to collect more funds. As prior literature already shows, perceptions of country-level legitimacy affect investors' decisions.[2] For example, Bell, Moore, and Al-Shammari [2008] show that the perceived legitimacy of the country-of-origin drives the value of foreign IPO-listings. In fact, prior literature on the drivers of ICO success already indicates that certain countries are able to receive more funding (U.S. and Slovenia in Adhami, Giudici, and Martinazzi [2018]; U.S. in Fisch [2019]).

We exploit an extensive database of over 2,205 ICOs from 105 countries between 2015 and 2018. We derive investors' perceptions of the legitimacy of a country from where the ICO originates, through World Bank Governance Indicators. Our measure incorporates six distinctive aspects of institutional development, namely (i) Control of Corruption, (ii) Rule Of Law, (iii) Government Effectiveness, (iv) Regulatory Quality, (v) Political Stability, and (vi) Voice and Accountability. We expect that the ICOs that are issued from countries which score higher values on these dimensions, are perceived to be more trustworthy and therefore will be able to attract more funds. Our results show that ICOs from countries with higher institutional strength are more successful, that is (i) they have a higher probability of being traded on a secondary exchange, and (ii) they raise more funding during the initial coin offerings. Our results also hold for a battery of methodological tests.

Next, we study the ex-post performance of ICOs through their respective price volatility. As the findings of Hooper, Sim, and Uppal [2009] and Low, Kew, and Tee [2011] indicate, the quality of governance is negatively associated with stock market total risk and idiosyncratic risk. Since the predominant nature of the cryptocurrency market is speculative, many of these coins operate in an environment of high volatility [Adhami et al., 2018]. We thus expect investors' perceptions concerning the legitimacy of the country where the coin is issued, to lower the perceived riskiness of the investment. In turn, this would result in lower volatility of the coin price. We find that the ICOs originating from countries with higher institutional strength experience substantially lower volatility.

Furthermore, we exhibit that there is an interconnectedness between ICO regulations and institutional strength with regard to their impact on the development of the ICO market. Following the recent surge in ICO activity, many countries and jurisdictions have introduced relevant regulations, varying greatly in capacity and approach, in order to curb potential risks and promote possible gains. However,

[1] More specifically, the SEC was able to stop the ICO of 'AriseCoin' as "(they) lied to AriseBank's investors by pitching the company as a first-of-its kind decentralized bank offering its own cryptocurrency for customer products and services.". To furthher illustrate the gravity of riskiness concerning ICOs, the website https://deadcoins.com/ lists about 934 cryptocurrency scams or Ponzi schemes.

[2] Legitimacy is traditionally defined as the right and acceptance of an authority by its environment [DiMaggio and Powell, 1983].

these regulatory actions are not consistent across jurisdictions, and in most cases are still in preliminary stage to offer thorough guidelines. We manually categorize each country based on the presence of ICO regulations in the country and distinguish three categories of ICO regulation: (i) unregulated (ii) regulated or with extensive guidelines, and (iii) strictly banned. We find that the presence of ICO regulations significantly weakens the influence of institutions in supporting ICO activity. This result highlights the fact that, in the absence of ICO-specific regulation, a country's institutional strength provides an important means for assessing the quality of ICO projects.

The bottom-line of our results is that despite the features of decentralization and disintermediation of ICOs, a country's institutional strength facilitates the development and success of the ICO market. In other words, investors use the country's institutional strength as a proxy for the ICO project's unobserved quality. The positive effect of institutional background on ICOs shows that formal institutions play a direct role in shaping investors' trust and reducing perceived risks. We also evidence that institutions are particularly relevant in countries where ICO regulations are weak or absent, which indicates that institutions, to some extent, substitute for the regulatory void surrounding ICOs.

Our results contribute to a better understanding of the ICO phenomenon in three ways. First, this study extends the literature on the determinants of ICO success by taking an institutional approach. The closest work to ours is by Huang, Meoli, and Vismara [2019]. Based on 905 ICOs, their study reveals that ICOs take place more frequently in countries with developed financial systems, public equity markets, and advanced digital technologies. They also find that the availability of investment-based crowdfunding platforms is positively associated with the emergence of ICOs, while debt and private equity markets do not provide significant effects. Our paper complements their findings by showing that the signal sent by the project country's institutional strength on the quality of the ICO infers trust to investors, leading to a higher number of ICOs in countries with strong institutions. While Huang et al. [2019] restricts their study to the analysis of the number of ICOs per country, we also examine the impact of institutions on the probability of success and a token variability. In addition, we evidence the mitigating impact of regulation on the importance of institutional strength on ICO development.

Second, despite their potential game-changing role in finance, few papers so far empirically investigate the emergence of ICOs. Most studies discuss the legal or managerial aspects of this phenomenon, without an empirical analysis. Few exceptions are the papers by Adhami et al. [2018]; Amsden and Schweizer [2018]; Fisch [2019]; Momtaz [2018]. Fisch [2019] investigates the signals that increase the chances of success in a sample of 456 ICOs completed between March 2016 and March 2017. He shows that, while patents are insignificant, technical white papers are an effective signal to investors and can help predict ICO success. Similarly, he finds that ICOs with a high quality code raise more capital. Adhami et al. [2018] document that an ICO's success is positively related to the presence of codes for the Blockchain project and the availability of pre-sale ICOs. They also find a significant and positive effect of token bonus scheme (i.e., grant token holders the right to access platform services) on the ICO success rate. Using a sample of 1009 ICOs from 2015 to March 2018, Amsden and Schweizer [2018] document that better connected CEOs and larger team size are positively correlated with the success chances of ICOs. With regard to the short-run performance, Momtaz [2018] finds that first-day returns on investments in ICOs range from 6.8 to 8.2%.

Third, while our results can be seen as academic in the first place, they have obvious implications for policy. Our results provide much-needed evidence to policy-makers by enriching debates on the appropriate institutional framework that could stimulate the development around ICOs. Given the positive impact of institutions, improving institutions may be a means to further the development of generalized trust in ICOs, where this social capital is lacking or in short supply. Furthermore, by contributing to the development of generalized trust, institutional (re)engineering may eventually result in economic and democratic progress in societies as well. Our conclusions on the dynamics of ICOs throughout the world is even more pressing given that they have gained widespread global adoption in a very short period. In fact, our sample shows that the number of ICOs increased by a factor of 100 in the last two years, with a cumulated total amount raised of US$20 billion, which makes the

ICO market comparable to the US IPO market in 2016. This significant rise of the ICO market raised regulatory concerns. However, the response across nations has been disparate, failing to provide consistent regulatory framework across jurisdictions. Many authorities are still taking the "wait-and-see" approach, buying time to better understand the implications of this innovation before any extensive regulatory framework is provided. Our study provides some empirical evidence illustrating what these regulatory efforts mean to the development of ICOs.

This paper is organized as follows. Section 2 defines the concept of ICOs and describes the international trends of ICOs. Section 3 sets the theoretical framework and hypotheses, while Section 4 summarizes the data and the methodology. Section 5 describes the regression results and robustness checks. We conclude in Section 6.

2 ICO definition and international trends

In this section, we define and discuss the evolution of ICOs over time and across geographic regions. We also elaborate on the average amount raised, the probability of success and return volatility across countries. This section will not only show that the frequency of ICOs has grown at a breakneck speed, but also justify the need to monitor ICO emissions and better understand the necessity to identify the factors that accelerate their international development.[3]

2.1 ICOs around the world – A heterogeneous development

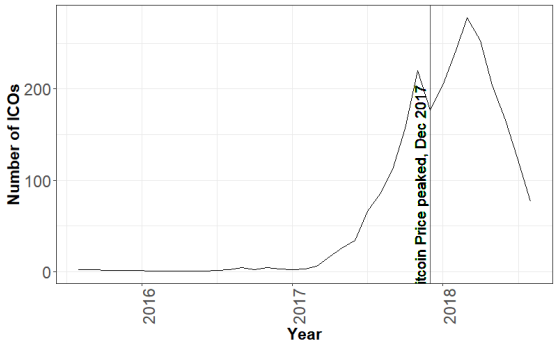
The earliest token sales of ICOs occurred as recently as July 2013 with Ethereum (3700B = $2.3m) in the United Kingdom and in 2014 with Karmacoin in the United States. As shown in Figure 1a, the number of ICOs mushroomed in early 2017 with 905 ICOs, peaking during the first half of 2018 with 1,347 ICOs. We then observe a slowdown in the following months. Figure 1b illustrates the evolution of ICOs' success rates over time. We find that ICO success significantly decreased in 2017, which coincides with the significant increase in the number of ICOs, indicating the presence of lemons in the market. Figure 1c also shows that the total amount raised per month has steadily fluctuated around USD one billion per month between 2017 and 2018. The spike seen in the second quarter of 2017 is due to the EOS ICO, which raised over USD four billion. In total, between 2015 and 2018, the cumulated amount raised by ICOs equals USD 20 billion (Figure 1d). Furthermore, with regard to the average volatility among the tokens that were traded in a secondary market, Figure 1e shows that token price volatility in the second market ranges between 0.5 and 1.5.

In Panel A of Table 1, we split our sample by geographical regions. We observe a striking heterogeneity in the ICO activity across the different regions. We clearly see that Europe and Central Asia [1,157 ICOs] are leading the ICO market in terms of frequency, while East Asia and the Pacific [506 ICOs] region and North America [430 ICOs] also experience a considerable amount of activity. In terms of the probability of being traded in a secondary market, East Asia and Pacific [0.30] lead the way, followed by projects launched in Latin America and the Caribbean [0.29]. The two regions with most amount raised through ICOs were North America [USD 7,539,538,461] and Europe, followed by Central Asia [USD 6,196,169,708]. On the other hand, South Asia observed the least ICO activity [42 ICOs] and raised the least amount [USD 163,387,796]. The ICOs based in South Asia also performed worst in terms of success rate [0.10], while among the tokens that were issued and traded faced the most price volatility [1.88].

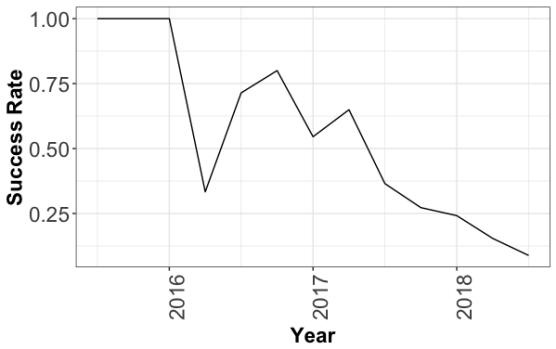
Panel B of Table 1 ranks the top 50 countries following the frequency, success rate, amount raised and volatility of ICOs. We find that the top five countries with the highest number of ICOs in our sample are the USA, Singapore, the United Kingdom, Russia and Switzerland. The top five countries constitutes 45.8% of the sample. Note the presence of tax-haven countries such as Gibraltar, Cyprus, British Virgin Islands, the Seychelles and Panama in the top 50, which indicates that ICOs' locations

[3] In Section 4 we describe the sample that we used for generating the data discussed here.

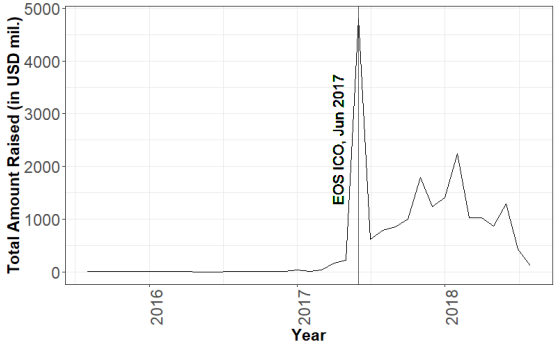
Figure 1: Number of ICOs, the success rate (in %), amount raised (in USD mil.), cumulative amount raised (in USD mil.) and volatility (GARCH) between 2015 and 2018.



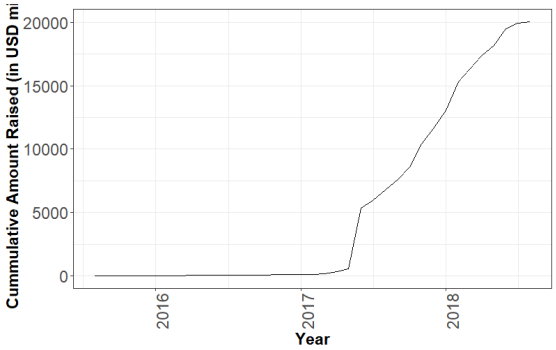
(a) Number of ICOs



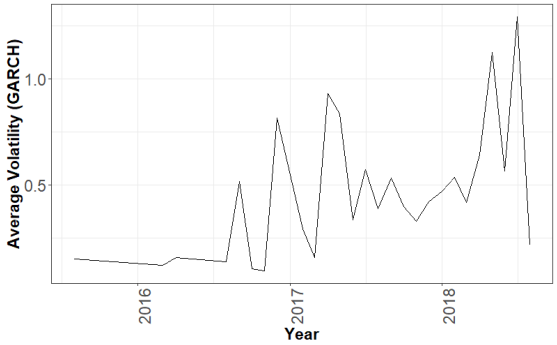
(b) Success Rate



(c) Total Amount Raised



(d) Cumulative Amount Raised



(e) Average Token Price Volatility

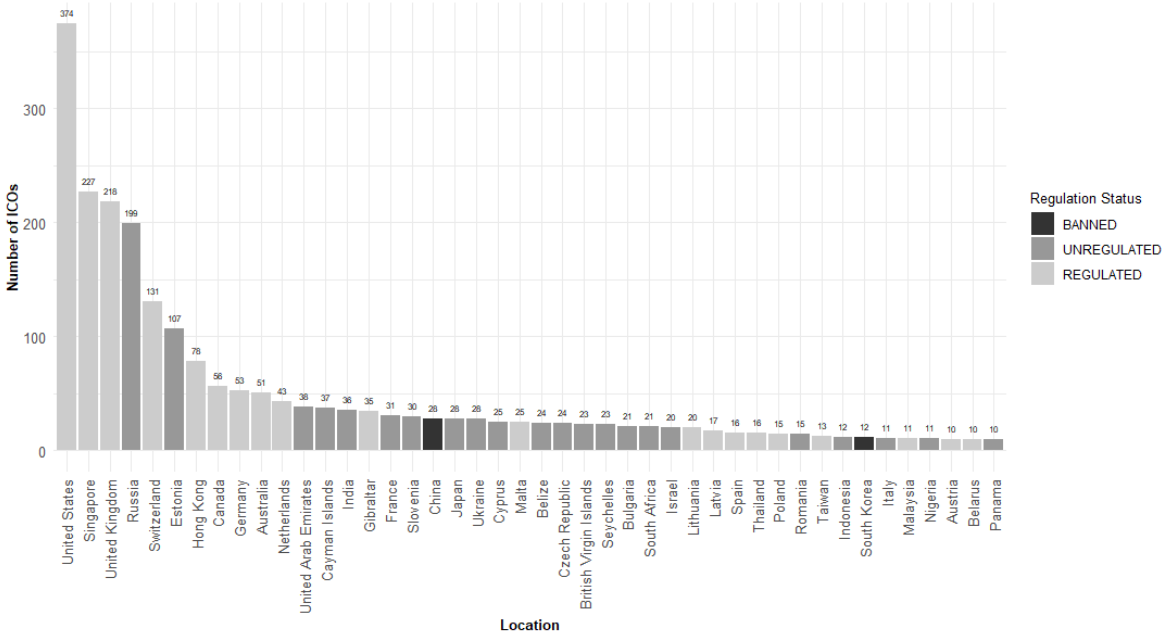
Table 1: Regional and Country-level ICO Summary

Location	$ICOs$	Location	$\%Successful$	Location	$AmountRaised(USD)$	Location	$\overline{Volatility}$
Panel A – Geographical Regions							
Europe and Central Asia	1,157	East Asia and Pacific	0.30	North America	7,538,538,461	South Asia	1.88
East Asia and Pacific	506	Latin America and the Caribbean	0.29	Europe and Central Asia	6,196,169,708	Latin America and the Caribbean	0.80
North America	430	North America	0.27	East Asia and Pacific	3,605,674,372	Middle East and North Africa	0.65
Latin America and the Caribbean	148	Europe and Central Asia	0.22	Latin America and the Caribbean	1,861,854,975	East Asia and Pacific	0.64
Middle East and North Africa	83	Middle East and North Africa	0.20	Middle East and North Africa	460,615,891	Europe and Central Asia	0.50
Sub-Saharan Africa	64	Sub-Saharan Africa	0.16	Sub-Saharan Africa	201,127,809	Sub-Saharan Africa	0.35
South Asia	42	South Asia	0.10	South Asia	163,387,796	North America	0.33
Panel B – 50 Top Countries							
United States	374	Armenia	1	United States	7,160,637,743	Saint Vincent and the Grenadines	7.58
Singapore	227	Saint Vincent and the Grenadines	1	Singapore	1,794,428,159	Latvia	4.08
United Kingdom	218	Costa Rica	0.57	Switzerland	1,594,505,077	Philippines	4.04
Russia	199	Argentina	0.5	United Kingdom	1,118,294,035	Panama	3.56
Switzerland	131	China	0.5	Cayman Islands	892,657,454	Mexico	3.15
Estonia	107	Finland	0.5	Russia	601,896,136	Liechtenstein	2.15
Hong Kong	78	Lithuania	0.5	British Virgin Islands	598,124,974	India	1.88
Canada	56	Saint Kitts and Nevis	0.43	Estonia	594,236,459	Belize	1.09
Germany	53	Liechtenstein	0.4	Hong Kong	545,312,266	Malaysia	1.08
Australia	51	New Zealand	0.4	Canada	377,900,717	United Arab Emirates	1.07
Netherlands	43	Singapore	0.37	Gibraltar	370,008,571	Luxembourg	0.97
United Arab Emirates	38	Slovenia	0.37	China	342,036,024	Ukraine	0.94
Cayman Islands	37	Malaysia	0.36	Lithuania	319,574,100	Japan	0.94
India	36	Switzerland	0.36	Germany	287,673,441	Hong Kong	0.91
Gibraltar	35	Cayman Islands	0.35	Japan	248,878,556	Austria	0.91
France	31	British Virgin Islands	0.35	Israel	217,157,456	Bulgaria	0.9
Slovenia	30	Gibraltar	0.34	Australia	170,413,414	Spain	0.89
China	28	Colombia	0.33	Cyprus	168,974,430	Czech Republic	0.73
Japan	28	South Korea	0.33	Malaysia	168,374,710	Nigeria	0.71
Ukraine	28	Romania	0.33	France	154,757,920	China	0.66
Cyprus	25	France	0.32	Slovenia	143,277,292	Malta	0.64
Malta	25	Japan	0.32	India	138,332,862	Russia	0.64
Belize	24	Malta	0.32	Malta	137,384,603	Netherlands	0.61
Czech Republic	24	Spain	0.31	Romania	115,156,842	Slovenia	0.58
British Virgin Islands	23	Austria	0.3	Location Unspecified	111,857,504	Singapore	0.58
Seychelles	23	United States	0.28	United Arab Emirates	106,073,832	Gibraltar	0.58

Bulgaria	21	Hong Kong	0.27	Belize	104,843,983	Saint Kitts and Nevis	0.45
South Africa	21	Bahamas	0.25	Spain	99,786,049	Estonia	0.44
Israel	20	Cambodia	0.25	Seychelles	98,328,401	United Kingdom	0.4
Lithuania	20	Marshall Islands	0.25	Thailand	95,223,269	Armenia	0.35
Latvia	17	Mauritius	0.25	New Zealand	94,423,469	Switzerland	0.35
Spain	16	Mexico	0.25	Netherlands	90,702,502	South Africa	0.35
Thailand	16	Cyprus	0.24	South Africa	86,920,622	Cyprus	0.34
Poland	15	Seychelles	0.22	Isle of Man	65,142,495	United States	0.34
Romania	15	United Kingdom	0.22	Poland	62,518,755	Australia	0.31
Taiwan	13	Belize	0.21	Ukraine	61,658,748	Seychelles	0.31
Indonesia	12	Czech Republic	0.21	Austria	50,852,123	New Zealand	0.31
South Korea	12	Belarus	0.2	Mexico	50,672,147	Cayman Islands	0.3
Italy	11	Israel	0.2	Bulgaria	50,416,983	Canada	0.29
Malaysia	11	Panama	0.2	Czech Republic	46,836,596	Turkey	0.29
Nigeria	11	Sweden	0.2	Bahamas	44,472,578	Germany	0.25
Austria	10	Canada	0.2	Colombia	40,451,640	France	0.24
Belarus	10	Australia	0.2	Argentina	40,200,000	Lithuania	0.24
Panama	10	Bulgaria	0.19	South Korea	38,912,302	Finland	0.24
Belgium	8	Germany	0.19	Luxembourg	38,259,517	Colombia	0.23
Brazil	8	Netherlands	0.19	Slovakia	37,378,158	Costa Rica	0.22
Luxembourg	8	Russia	0.18	Indonesia	33,027,845	Argentina	0.2
Mexico	8	Indonesia	0.17	Liechtenstein	27,700,000	Bahamas	0.2
Philippines	8	Estonia	0.16	Saint Kitts and Nevis	26,885,000	Italy	0.19
Costa Rica	7	Ireland	0.14	Panama	26,000,000	Romania	0.18

Note: Panel A and B respectively present four lists of seven geographic regions and the top 50 locations in terms of Number of ICOs, ICO Success Rate, Total Amount Raised and Average Token Price Volatility (GARCH).

Figure 2: Number of ICOs per location and Regulation status



are to an extent chosen in consideration of the country's tax policies. Moreover, we observe that ICOs based in known tax havens, such as Cayman Islands and British Virgin Islands, raised significant amounts, despite having lower number of ICOs. Among the ICOs whose tokens were traded in a secondary market, we observe that those based in Saint Vincent and the Grenadines, Latvia, Philippines, Panama and Mexico faced the highest volatility, suggesting that there was a greater level of speculative behavior surrounding the tokens from these ICOs.

2.1.1 Heterogeneity in ICO Regulations

Figure 2 illustrates the heterogeneity and dynamism regarding ICO regulation throughout the world. The challenge for authorities is to contain the potential risks, while avoiding the danger of stifling the innovation. While some countries have embraced cryptocurrencies as a new means of financing, others have taken more cautioned positions. For instance, Switzerland has positioned itself as one of the leading ICO hubs in the world by creating a favorable ecosystem for blockchain technology and cryptocurrencies.[4] Similarly, authorities in Anguilla introduced The Anguilla Utility Token Offering Act, 2018 (AUTO Act), establishing the world's first cryptocurrency regulatory regime specifically for ICOs offering utility-based tokens. Malta and Gibraltar are some of the other jurisdictions that have introduced designated regulations (Virtual Financial Assets Act, 2018; Financial Services - Ledger Technology Providers - Regulations, 2017; respectively).

However, many other countries are prudent at best, resorting to limited guidelines outlining the potential application of existing laws. In several countries, including the Austria, Germany, New Zealand and United States, the nature and applicability of regulations are evaluated on a case-by-case basis, depending on whether the issued tokens are deemed securities. One of the main regulatory hurdles stems from the variability of legal status of the issued tokens, which would trigger different taxation laws, disclosure directives and registration requirements.[5] Consequently, tax regimes relating

[4]In January 2018 the Swiss State Secretariat for International Finance (Staatssekretariat für internationale Finanzfragen, SIF) reported that it would set up a working group on blockchain and ICOs. The working group will work together with the Federal Ministry of Justice and FINMA and involve interested businesses. *(https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-69539.html)*

[5]In the United States, the "Howey Test" currently governs which investment scheme is determined as a security (22SEC v. W.J. Howey Co., 328 U.S. 293, 1946), whereas, its European counterpart is the MiFID regulation.

to ICOs and crypto-transactions vary widely. For instance, in Belarus, one of the first countries to introduce regulations solely for ICOs, specific exemptions are provided to various digital asset-related transactions and activities. In several countries, such as, South Africa and Romania, capital gains from trading digital currencies are taxed as income, whereas in Israel, profits from cryptocurrency mining are subject to Value Added Tax.

The potential for money-laundering and financing illicit activities is another concern for regulators. Several jurisdictions have introduced guidelines and amendments to capture digital asset trades within the purview of existing respective regulatory frameworks. In Belarus and Malta, two countries with extensive ICO-specific regulatory regimes, existing anti-money laundering frameworks are extended to apply to digital asset exchanges. These regulations are particularly targeted at the digital currency exchanges, and include stipulations, such as, mandatory verification of identity of clients seeking to convert cryptocurrencies into fiat (e.g. Czech Republic). Similarly, in the Isle of Man, at least two of the ICO members are required to be present in the country during the ICO period.

In addition, due to the risks and obscurity, some countries have rather taken extreme regulatory positions, such as in South Korea and China, where ICOs are outright banned. In some countries (Algeria, Bolivia, Morocco, Nepal) transactions in cryptocurrencies are prohibited, though it is unclear whether these prohibitions extend to ICOs. Furthermore, countries like Colombia, India and Pakistan have imposed indirect restrictions by barring financial institutions from dealing with cryptocurrencies.

3 Literature summary and hypothesis development

Despite the heterogeneity in ICO development and regulation across nations, little is known about their dynamics in the international markets. Therefore, we ask why some nations observe more frequent ICO activity and simultaneously why ICOs based in some nations observe more favorable outcomes. In this paper, we focus on two key factors in the international ICO market (i) a country's institutional strength and (ii) the impact of regulation surrounding ICOs.

3.1 Institutional theory and the ICO market

The limited research that exists on ICOs clearly adopts a neo-classical economics approach and generally ignores the factors that facilitate the diffusion, success and uncertainty of ICOs in a given country. In contrast to neo-classical economics, institutional theory does not take an economy's institutional structure for granted, but aims at explaining how institutions determine the terms of economic interactions. In fact, while prior research mostly aims at identifying various ICO-specific determinants, few studies examine the impact of country-specific characteristics that may explain international differences in ICO frequency, success and uncertainty. We fill this gap in the literature by examining the role played by institutions in explaining the diffusion of ICOs across the world.

Throughout history, countries and societies have developed institutions that reduce uncertainty in economic exchange, protecting transacting parties and enabling trust. Institutions define the choice set, determine transaction and production costs, and hence influence the outcomes of economic activity [Bruton, Ahlstrom, and Li, 2010; McMullen, Bagby, and Palich, 2008]. North [1991] characterizes institutions as "the rules of the game" that establish the incentives for the members of the society – individuals or organizations – to engage in economic activities. In his theory of institutional change analyzing how markets develop, North [1981] argues that exchange can take place without formal institutions such as property rights, as long as societies are of small size (families, tribes, villages,...). If, however, trade occurs over longer distances, institutions must be found to protect against what economists call opportunism (i.e. fraud and deceit). Institutions such as norms, measures and weights as well as money as a medium of exchange have developed in order to lower the costs of market exchange. In the settings of urbanization and globalization, further institutional developments are required to facilitate trade (protection of property rights, international arbitration, and diverse screening and signaling mechanisms). Coase [2012] argues in a similar fashion: "When the facilities are

scattered and owned by a vast number of people with very different interests (...) the establishment of a private legal system would be very difficult. Those operating in these markets have to depend, therefore, on the legal system of the State."

As such, institutions create familiarity and define what is legitimate in a market, which then facilitates trust between actors [Dahlstrom and Nygaard, 1995; North, 1991]. In particular, strong institutions ensure that property rights are respected, people live up to their promises, externalities are held in check, competition is fostered and information flows smoothly [Johnson, McMillan, and Woodruff, 2002]. In fact, prior research shows that institutions reduce the ambiguity surrounding the safety and security of investors' funding contribution and, thereby, influence various economic activities and outcomes. For instance, a vast body of theoretical and empirical work on foreign direct investments (FDI) has pointed towards the importance of institutions. The dominant view in that literature is that countries with good governance can attract more FDI [Gani, 2007; Globerman and Shapiro, 2002; La Porta, Lopez-de Silanes, Shleifer, and Vishny, 1998], whereas an environment of weak governance is not expected to sufficiently protect the investments [Globerman and Shapiro, 2002].[6]

This evidence implies that a country's institutional background bridges across knowledge domains to help facilitate cooperation between individuals and organizations, who otherwise would find it difficult to trust each other [Bachmann and Inkpen, 2011]. This means that the role of institutions in a trust-building process is particularly pertinent at the onset of a relationship where uncertainty is particularly common and avenues for building direct and personal trust are not available [Bachmann and Inkpen, 2011; Scarbrough, Swan, Amaeshi, and Briggs, 2013]. An early study of socio-economic changes in the US in the 19^{th} and early 20^{th} century by Zucker [1986] argues that amidst the wave of migration leading to depletion of channels for relational trust, institutions played a crucial role in motivating trust that served as a basis for economic transactions. As such, Zucker [1986] demonstrates how institutional trust gains increasing importance as societies become more differentiated and dispersed.

In the ICO setting, where investors and entrepreneurs are spread throughout the world, unencumbered by physical and, to an extent, regulatory hurdles, it is only likely that the role of institutions becomes central. We posit that investors associate the country-of-origin of an ICO as a signal of its quality and reliability. Under such circumstances, we therefore expect that a country's institutions, as a set of political, economic and contractual rules, help foster the development of the ICO market, and also increase trust with investors, which results in higher levels of ICO success and lower ICO token volatility.

Hypothesis 1a: ICOs occur more frequently in countries with a strong institutional background.

Hypothesis 1b: The strength of a country's institutions has a positive impact on the ICOs' probability of success and the amount raised during the ICO.

Hypothesis 1c: The strength of a country's institutions reduces token price volatility.

3.2 Regulations as a substitute to institutions

Apart from the general institutional conditions, direct actions of authorities through regulations are shown to reduce market uncertainty, influencing organizational strategies, market entry decisions and confidence among investors [see, e.g., Bittlingmayer, 2000; Cambini and Jiang, 2009; Hadani, Bonardi, and Dahan, 2017; Kirkpatrick, Parker, and Zhang, 2004; Kotakorpi, 2006; Shaffer, 1995; Shan, Singh, and Amburgey, 1991; Teisberg, 1993; Yang, Burns, and Backhouse, 2004]. Regulations lead to the development of recognized standards for industry members, helping establish industry

[6]For instance, from a panel data analysis of data from 17 Latin American countries, Staats and Biglaiser [2012] find that rule of law and judicial strength are important determinants of FDI inflow.

legitimacy, which, in turn, supports investors' trust [Aldrich and Fiol, 1994]. As remarked by Peltzman [1976], regulations help reduce entrepreneurs' risks, as in its absence there is higher variability of profits and greater uncertainty about future cash flows. In the presence of regulatory uncertainty, researchers argue that entrepreneurs apply a wait-and-see strategy and delay investments until they have better planning reliability [Bittlingmayer, 2000; Yang et al., 2004]. The effects of regulatory uncertainty on investments are observed in various settings, including biotech, telecommunication, energy and even foreign investment to developing countries [Cambini and Jiang, 2009; Fan, Hobbs, and Norman, 2010; Kirkpatrick et al., 2004; Shan et al., 1991]

Considering its role in reducing uncertainty and risks, regulations are likely to moderate the influence of institutions, which are particularly vital in environments where uncertainty is rife. As discussed in Section 2.2.1, regulations around ICOs are still preliminary and evolving, and greatly incoherent across countries. For instance, in countries like Gibraltar and Switzerland, authorities have introduced extensive regulations and guidelines in relation to ICOs, greatly curtailing concerning ambiguities, while in most other countries, a clear regulatory position is yet to be established. As such, the level of uncertainty vary considerably between countries, and we expect the influence of a country's institutions on ICO activity and outcome to vary as well, in accordance with the status of ICO regulation in the country. If investors believe to be particularly vulnerable to potential fraud and misuse of funding by the token-issuers, the information signal sent by the institutions are likely to be more relevant in establishing credibility. Put differently, we argue that the impact of institutions in motivating ICO activity and trust among investors to be weaker in the presence of ICO regulations.

Hypothesis 2a: The ICO regulations mitigate the positive impact of a country's institutional strength on ICO frequency.

Hypothesis 2b: The positive impact of a country's institutional strength on the ICOs' probability of success and the amount raised is stronger when ICO regulations are absent.

Hypothesis 2c: The negative relationship between the strength of a country's institutions and token price volatility is stronger when ICO regulations are absent.

4 Sample, data and methodology

As ICOs circumvent centralized institutions, gathering data and conducting empirical studies on ICOs is particularly challenging. ICOs relieve ventures of the need to rely on a central authority, and therefore, ventures may directly and exclusively provide all the relevant ICO information on their websites.[7] In addition, after the ICOs have culminated, ventures may choose to remove most of the ICO-related information from their websites to adjust to the shift in focus. Therefore, the task of gathering complete population data of ICOs is practically infeasible. However, due to the emergence of third party ICO-tracking websites that archive information on ICOs, we are still able to gather detailed information about considerably large pool of ICOs. In this paper, we use one of the prominent ICO-listing websites, ICOBench.com. This website allows us to compile an extensive dataset of ICOs consisting of over 2,000 ICOs launched between April 2015 and September 2018. This website has been used often in prior literature, with Amsden and Schweizer [2018] arguing that ICOBench.com provides the most accurate and detailed information for the largest number of ICOs. We supplement this dataset with additional information from the website coinmarketcap.com to obtain the data on post-ICO prices of the issued tokens [Amsden and Schweizer, 2018; Howell, Niessner, and Yermack, 2018]. Since

[7] Due to the decentralized nature of blockchain, ICOs can opt out from attribution to any jurisdiction. In fact, Adhami et al. [2018] find that many ICO projects cannot be attributed to a specific country, and a significant portion (12.2%) of their sample adopt 'decentralized governance' mechanism. In our sample, we find 79 (3.18%) ICOs that did not specify a location or stated the location as 'worldwide'.

ICOs come in different shapes and sizes, we try to mitigate the influence of extreme cases. For instance, some ICOs, such as, EOS and TaTaTu, were extremely successful, raising over USD 4 billion and USD 500 million, respectively. Given the exceptionality of such cases, we winsorize the extreme amount raised values in our study sample to the 99th percentile.

This study focuses on three effects of the ICOs' country of origin: (i) its relationship with the extent of ICO activity, ii) its impact on the success of the ICOs launched, and (iii) its impact on the price volatility of the issued tokens in the secondary market. Therefore, the study includes both country-level model (relating to ICO activity in a country) and ICO-level models (relating to ICO outcome). In relation to the country-level analysis, our sample data consists of 160 countries.[8] In terms of ICO-level data, our total study sample contains 2,205 observations.

4.1 Variable Description

4.1.1 Dependent Variables

We proxy for ICO activity using the number of ICOs launched in the country ($NUMBER\_OF\_ICO$). We include all countries/jurisdictions with complete information, including those that have not had any ICOs launched, in order to avoid sampling bias.

With relation to ICO success, such an obvious proxy does not exist. As discussed by Amsden and Schweizer [2018], defining ICO success is not a trivial task. Specifications of ICOs are not rigid and consistent. Popular measures of success used for other modes of financing, such as successfully raising the goal amount (as in crowdfunding), are not feasible in the context of ICOs, as specifying a target is not a compulsion. For instance, in our sample we find only 43.7% of the ICOs specify a soft-cap, the term used for pre-set funding target in ICOs.[9] Given the lack of traditional literature-backed measure of success, Amsden and Schweizer [2018] suggest identifying successful ICOs as those that subsequently trade their tokens on a secondary exchange. As all ICOs look to issue tradeable tokens, irrespective of the nature of business or ICO-specificities, it can be argued to be the most suited measure of success. Therefore, we use a binary variable indicating whether the issued ICO token is eventually traded on the exchange, coinmarketcap.com, as our first measure of success ($SUCCESS$) [see, e.g., Adhami et al., 2018; Amsden and Schweizer, 2018; Felix and von Eije, 2019; Fisch, 2019; Howell et al., 2018]. In addition, in order to distinguish the magnitude of success, we also use the amount raised as a dependent variable ($AMOUNT\_RAISED$) [see, e.g., Adhami et al., 2018; Fisch, 2019]. However, this measure of success is greatly sensitive to projects' other attributes, in particular, the size of the soft-cap. Furthermore, ICOs are not compelled to disclose the amount raised, and therefore, ICOs without this information are not included in the following analyses.

We also examine the impact on the post-ICO performance, focusing on the price volatility of the issued tokens ($VOLATILITY$). We use the optimal Generalized Autoregressive Conditional Heteroskedastic (GARCH) model, specifically, order 1 standard GARCH model with skewed Student-t distribution to estimate volatility [see, for discussion on Bitcoin and cryptocurrency price volatilty Bariviera, Basgall, Hasperué, and Naiouf, 2017; Chu, Chan, Nadarajah, and Osterrieder, 2017; Engle, 2001; Katsiampa, 2017; Klein, Thu, and Walther, 2018; Phillip, Chan, and Peiris, 2018].[10] In volatility-related analyses, we only include tokens with more than 90 days of daily price data to mitigate erroneous estimations. The autoregressive model for the conditional mean and first-order GARCH model for the conditional variance can be specified as follows:

[8] Our ICO-level sample consists of 105 countries that have lauched at least one ICO. However, in order to avoid sampling bias we include countries that have not launched any ICO in the country-level sample, therefore, there are 160 countries.

[9] Soft-caps can be viewed as equivalents to goal amounts in all-or-nothing crowdfunding. If the soft-cap is not met by the end of the ICO, contributors are automatically reimbursed.

[10] Studies on Bitcoin and other prominent crypto currencies observe the presence of long memory and leverage effect, justifying the use of GARCH models to estimate the time-varying volatility in Bitcoin and other cryptocurrency data.

$$r_t = c + \sum_{i=1}^{s} \phi_i r_{t-1} + u_t$$

$$u_t = h_t z_t, \quad z_t \sim i.i.d(0,1),$$

where r_t is the token price return on day t, u_t is the error term, z_t is a white noise process, and h_t is the conditional standard deviation.

4.1.2 Institutions

The institutional background of the ICOs (i.e. the level of institutional development in the country in which the project is based) is measured by using the World Bank Governance Indicators [Kaufmann, Kraay, and Mastruzzi, 2010]. It includes six distinctive aspects of institutional development, namely 'Control of Corruption', 'Rule Of Law', 'Government Effectiveness', 'Regulatory Quality', 'Political Stability', and 'Voice and Accountability'.[11] This is preferred over other measures of institutional development, as it covers a greater number of countries and is updated yearly. Furthermore, the potential for source bias is particularly low, as the index is prepared with inputs from 30 different data sources, which includes household and firm surveys, commercial business information providers, non-governmental organizations and public sector organizations [Kaufmann et al., 2010]. As such, the measure is widely used in studies from diverse fields focusing on country-level institutions [see, e.g., Chortareas, Girardone, and Ventouri, 2013; Elbahnasawy, 2014; Li and Zahra, 2012; Stephan, Uhlaner, and Stride, 2015].

We construct a unified measure of country-level institutional development in order to evaluate the impact of broader institutional development. Given the six institutional dimensions are highly correlated, we follow Li and Zahra [2012] and use principal component analysis to construct the composite index. We use the institution scores for the past decade (2009-2018) to generate the composite score. The first principal component accounts for 82.46% of the total variance, and is calculated as follows:

$$\begin{aligned} INSTITUTION = {} & RuleOfLaw \cdot 0.4430 + GovernmentEffectiveness \cdot 0.4306 \\ & + ControlOfCorruption \cdot 0.4397 + RegulatoryQuality \cdot 0.4382 \\ & + PoliticalStability \cdot 0.3698 + VoiceandAccountability \cdot 0.3102. \end{aligned} \tag{4.1}$$

Note that our results are consistent even when we take simple averages of the governance scores as the aggregate institution measure.

4.1.3 ICO-related Regulation

To test Hypothesis 2, we hand collect the data on the regulatory status of each country in our sample as of July 2019. The data is provided in Table 8 in the Appendix. For each country, we distinguish three regulatory categories. The first category includes countries with a designated ICO regulation, or an extensive set of guidelines or statements that introduce regulatory restrictions in relation to various relevant aspects of ICOs ($REGULATED$). The regulation mainly pertains to the legal status

[11] Cost of Corruption represents perceptions of exercise of public power for private gain. Rule of Law captures perceptions of confidence and obedience of the rules of society, such as contract enforcement, property rights, etc. Government Effectiveness represents quality of policy formulation and implementation, and the quality and independence of public and civil services. Regulatory Quality represents government's ability to formulate sound policies and regulations that promote private sector development. Political Stability represents the likelihood of government destabilization by unconstitutional or violent means. Voice and Accountability measure includes freedom of expression, freedom of association, and a free media.

of the issued ICO tokens (mainly for tax purposes) and safeguards concerning investors' and consumers' protection. The second group contains countries with no specific ICO regulatory framework ($UNREGULATED$). The group includes countries that have issued warnings or brief statements, but do not provide a clear regulatory stance. The second group of countries, such as France, Russia and Italy, also includes the ones that have released drafts and discussions on ICO regulations but are to implement them. The third group includes countries that have enforced outright bans on ICOs, such as China and South Korea ($BANNED$)[12]. The respective categories are shown in the second column of Table 8. The third column in the table provides a brief description of the regulatory status, while the fourth column provides the month in which the regulation was introduced or regulation-related activity occurred.

4.1.4 Control Variables

To test Hypothesis 1a and 2a, relating to the extent of ICO frequency in a given country, we introduce several country-level variables representing the country's socio-economic condition. These variables include, a dummy variable indicating whether the country is considered to have a tax haven status, the country's per capita GDP, population and tertiary level education enrollment. The variable (TAX_HAVEN) indicates whether the specified ICO country is a tax haven based on a list of 52 tax havens prepared by Hines [2010]. Amsden and Schweizer [2018] did not find any significant relationship between tax haven status of the ICO country and its outcome; however, they rely on a different list prepared by the OECD. We opt to use Hines [2010] list, as it appears to be less affected by internal biases that the OECD list is criticized for [Palan, 2009]. In addition, we control for prominent macro-level attributes that are likely to influence the extent of entrepreneurship development and ICO adoption and reasonably independent from institutional quality. We include natural logarithms of population ($POPULATION$), and the tertiary level education enrollment rate ($TERTIARY\_EDU$).

Hypothesis 1b, 1c, 2b and 2c test the diffusion, performance and volatility at the ICO level. We introduce ten ICO-specific control variables. The data is extracted from ICOBench.com and coinmarketcap.com. The analyses incorporate these controls along with the country-specific tax haven status indicator variable. The description of ICO-level control variables included in our model is as follows:

ICOBench Rating: Besides tracking and compiling ICO information, ICOBench.com also provides ratings for the listed ICOs. The scores are prepared using a combination of a standardized profile=rating algorithm and the evaluations provided by independent experts. The algorithm uses more than 20 different criteria, and provides evaluation in terms of four different ICO attributes, namely team, ICO information, product presentation, and marketing and social media presence. Similarly, the experts evaluate the projects in terms of the strength and trustworthiness of the team, the quality of the product, a short legal review, and the vision and business strategy that the entrepreneurs provide. We incorporate the aggregate score issued by ICOBench in our analysis ($RATING$). A note of caution is that these ratings are not permanent, and are frequently re-evaluated, therefore, some of the scores obtained during our data collection, may no longer correspond with the current scores on the website.

Pre-ICO Sale: Some ICOs opt to conduct a pre-sale of tokens before the actual ICO, primarily to cover various ICO-related expenses, such as marketing and setup costs. These sales are normally coupled with bonuses (discounted rates), and are typically targeted towards large and known investors, such as hedge funds and venture capital funds. The theoretical arguments on the impact of such sales are however inconsistent. On one hand, a successful pre-ICO could lead to price discovery, help generate momentum and signal endorsement. On the other, the need for a pre-ICO to cover expenses may signal the venture's lack of financial capacity, and even introduce the risk of token dump when

[12] We do not categorize countries that have introduced prohibitions on cryptocurrency transactions (without explict mention to ICOs) and those that have introduced restrictions specifically on regulated financial institutions as $BANNED$ since these countries are still able to host ICOs.

they are issued [Adhami et al., 2018; Amsden and Schweizer, 2018]. The recent studies on ICOs provide contradicting evidence in terms of the impact of having a pre-ICO on the subsequent ICO's success [Adhami et al., 2018; Amsden and Schweizer, 2018]. Nonetheless, we control for the impact of having a pre-ICO sale (PRE_ICO).

Bonus: In order to attract early birds, token sales in both pre-sale and the main ICO could include bonuses, which are token offers at discounted prices. We include a dummy variable indicating whether such bonuses were offered in either phase of the ICO. Again, it is difficult to anticipate the impact of including such bonuses. It could be that the offer of tokens with bonuses helps generate market interest and help raise greater amounts. However, it could also incentivize buyers to dump tokens at a premium when the bonuses are no longer applicable, thereby risking the loss of value of the issued tokens. Recent studies do not find any significant relationship between bonuses in ICOs and the amount raised or probability of being traded on coinmarketcap.com [Adhami et al., 2018; Amsden and Schweizer, 2018; Felix and von Eije, 2019].

Caps Present: ICOs can specify two key thresholds in order to protect interests of the funders. The first is a soft cap, which indicates the minimum amount that is targeted to be raised. Studies by Amsden and Schweizer [2018]; Howell et al. [2018] show that indeed having a stated goal amount does favorably influence ICO's success. Similarly, ICOs can specify a hard cap, which is the maximum amount the firm intends to raise. These upper limits are put in place to maintain scarcity, in order to preserve the issued tokens' individual value. Furthermore, the presence of a hard cap also helps buyers gauge the success of the ICO. We control for the impact of specifying these thresholds ($CAPS\_PRESENT$).

Ethereum Platform: Entrepreneurs can choose to develop their own blockchain, which requires greater resources and technical ability, or choose to build on an existing blockchain, such as Ethereum, NEO and Waves. Most ICOs are managed through smart contracts, or tokens, based on ERC20 and ERC223 Token Standard Contract that run on Ethereum blockchain. In addition to the ease of implementation, adopting popular protocols such as ERC20 helps firms exhibit transparency and signal reliability. When tokens are issued on Ethereum, investors can use standard wallets, which helps streamline investments. Furthermore, if investors foresee Ethereum as a benchmark for ICOs in the future, tokens based on Ethereum protocol may appear more attractive to investors. Studies find that indeed ICOs based on Ethereum platform are more likely to be successful and raise more funds [Amsden and Schweizer, 2018; Fenu, Marchesi, Marchesi, and Tonelli, 2018; Fisch, 2019]. Therefore, we control for this potential favorability of tokens on Ethereum blockchain with a dummy variable ($ETHEREUM$).

Whitelist+KYC: Implementing a Whitelist and Know Your Customer (KYC) in the ICO process is an indication of regulatory compliance. As dealing with cryptocurrencies essentially allows anonymity to buyers, these compliances help ensure the identity of the buyers and mitigate the potential for illicit activities. However, there is little evidence on whether these compliances affect ICO success. Amsden and Schweizer [2018] find no significant relationship between adherence to these compliances and ICO's success. Nonetheless, we control for the impact of implementing at least one of the two protocols ($WHITELIST\_KYC$).

Currencies Accepting: Offering investors the option to use different currencies reduces the number of steps needed to complete the investment, thereby easing the transaction process. Furthermore, it requires significant blockchain expertise for ICOs to accept numerous currencies, which may be viewed as a signal of greater technical capacity [Howell et al., 2018]. Still, exchanging capital between currencies is relatively simple and cheap, and therefore accepting more currencies may not have any significant role in the ICOs' success. In our model, we include a variable indicating the number of currencies that the ICO accepts (NUM_OF_CURR).

Fiat Accepting: We include a control variable indicating whether the ICO accepts direct fiat contributions ($FIAT$). Fiat currency is any money declared by the government of a country. Transactions or payments can be performed by using the currency and they are regulated by the banking system of the country, guaranteeing an exact level of security. Accepting fiat could expand the pool of investors beyond those owning cryptocurrencies. However, this could also be perceived as a lack of confidence, since it may appear that the venture does not believe in its capacity to complete the ICO with just the cryptocurrency investors [Amsden and Schweizer, 2018]. Furthermore, smart contracts cannot ensure that fiat contributions are returned if the soft cap is not reached.

Team Count: We control for the number of team members and advisors listed by the ICOs. Human capital is a crucial aspect that determines the quality of the venture and consequently the funders' decision to contribute [Baum and Silverman, 2004; Zacharakis and Meyer, 2000]. The variable does not look at the individual quality, but the aggregate capacity measured by the total number of team members involved. A simple headcount ($TEAM\_COUNT$) of the team could indicate the scope of the project and its capacity to handle the ICO process and the various tasks to successfully materialize the project. Previously, studies by Amsden and Schweizer [2018] and Cerchiello, Toma, and Others [2018] do find significant positive relationship between success of the ICO and the number of team members.

Average Ether Price: Ether is the second most popular cryptocurrency and has the second highest market capitalization (as of July 2019). Furthermore, considering that most ICOs are based on Ethereum blockchain, payments for tokens in ICOs are predominantly made with Ether (along with Bitcoin) instead of fiat currencies [Fisch, 2019][13]. Therefore, price of Ether is likely to be influential in funders' decision to contribute to ICOs. Firstly, an appreciating Ether could directly affect the amount raised by ICO in terms of US dollars. Secondly, an increase in Ether prices may indicate positive sentiment in the market regarding cryptocurrencies, and thereby encourage investments on ICOs. Alternatively, increase in price of Ether could also mean an increase in opportunity cost for funders. After investing in an ICO, the funders' funds are locked in until the issued tokens are traded, or returned if the soft cap is not reached. During this period, funders forsake the potential profits from simply holding their funds in Ether. We control for the average of daily Ether closing prices during the days in which the ICO was active ($PRICE\_ETH$). Amsden and Schweizer [2018] find a negative relationship between Ether prices and the probability of the tokens being traded when they take the price at the start date of the ICO.

4.2 Descriptive Analysis

In Table 3, we provide the summary statistics of our sample variables for both country- and ICO-specific variables. We observe that the average number of ICOs per country is 13.82. The table also provides the average institution score, population and the level of tertiary education enrollment among the countries included in the country-level analysis (0.07, 44.09 million and 41.90%, respectively). Furthermore, we find that 27.9% of the ICOs are from countries considered as a tax haven. We also observe that 25.4% of ICOs eventually issue tokens that are traded in coinmarketcap.com and that, on average, an ICO raises around USD 11.4 million. Furthermore, the GARCH volatility estimates range between 0 and 7.93. The aggregate institution scores range between -3.881 and 4.586, with a mean score of 2.282, which indicates that most ICOs are based in countries with higher institutional development.[14]

With respect to the ICO-specific control variables, we find that nearly half (45.3%) of the ICOs

[13] Bitcoin price is not included since we observe substantial correlation between Ether and Bitcoin prices (0.76).

[14] The institution variables are assigned to only those ICOs that indicate a specific location. It should also be noted that the World Bank Governance Indicator scores are not available for four jurisdictions which has witnessed ICO activity (Curaçao, Gibraltar, Isle of Man, and New Caledonia), and these observations are not included in our study sample (54 observations).

Table 2: Variable Description

Dependent Variables	
$NUMBER\_OF\_ICO$	The number of ICOs launched in a country.
$SUCCESS$	Indicates whether the token is eventually traded on a currency exchange.
$AMOUNT\_RAISED$	The amount raised during the coin-offering period in US dollars.
$VOLATILITY$	Measure of return volatility based on order 1 GARCH model with skewed Student-t distribution.
Independent Variables	
$INSTITUTION$	The institutional strength of the ICO country. The variable is a principal component-based aggregated measure from six World Bank Governance Indicators.
$REGULATED$	Indicates whether an ICO-related regulation or guideline is present in the ICO country at the time of the ICO launch.
Control Variables	
TAX_HAVEN	Indicates whether the country is located in a tax haven (source: Hines (2010)).
$POPULATION$	Natural logarithm of country population (in million) at the end of 2018 (source: World Bank).
$TERTIARY\_EDU$	Latest gross enrolment in tertiary education figure after 2008, measured as a percentage of the population in the corresponding age group (source: World Bank).
$RATING$	Aggregated score assigned to the ICO by experts from icobench.com.
PRE_ICO	Indicates whether a pre-ICO sale is conducted.
$BONUS$	Indicates whether bonuses are offered during the ICO.
$CAPS\_PRESENT$	Indicates whether a soft and/or a hard cap is specified.
$ETHEREUM$	Indicates whether the project blockchain is built on the Ethereum platform.
$WHITELIST\_KYC$	Indicates whether the ICO implements Whitelisting and Know Your Customer (KYC) compliances.
NUM_OF_CURR	The number of types of fiat and cryptocurrencies that the ICO accepts.
$FIAT$	Indicates whether the ICO accepts fiat currencies.
$TEAM\_COUNT$	The number of members in the team behind the ICO.
$PRICE\_ETH$	The average price of Ether during the ICO in US dollar.

Table 3: Descriptive Statistics

	N	Mean	Med	Std	Min	Max
COUNTRY-LEVEL VARIABLES						
Dependent Variables						
$NUMBER\_OF\_ICO$	160	13.820	1	43.820	0	374
Independent Variables						
$INSTITUTIONS$	160	0.074	−0.441	2.158	−4.595	4.586
Control Variables						
$REGULATED$	156	0.141	0	0.349	0	1
TAX_HAVEN	160	0.100	0	0.301	0	1
$POPULATION$	160	44.089	9.949	157.222	0.018	1392.730
$TERTIARY\_EDU$	160	41.903	38.511	29.400	0.775	126.383
ICO-LEVEL VARIABLES						
Dependent Variables						
$SUCCESS$	2,205	0.254	0	0.435	0	1
$AMOUNT\_RAISED$	1,140	11,384,855.000	5,311,802.000	15,005,685.000	26.000	71,968,000.000
$VOLATILITY$	513	0.495	0.140	1.019	0.00000	7.932
Independent Variables						
$INSTITUTIONS$	2,205	2.282	3.153	1.955	−3.881	4.586
$REGULATED$	2,176	0.333	0	0.472	0	1
Control Variables						
TAX_HAVEN	2,205	0.279	0	0.449	0	1
$RATING$	2,205	3.054	3.000	0.709	0.700	4.800
PRE_ICO	2,205	0.453	0	0.498	0	1
$BONUS$	2,205	0.454	0	0.498	0	1
$CAPS\_PRESENT$	2,205	0.684	1	0.465	0	1
$ETHEREUM$	2,205	0.883	1	0.321	0	1
$WHITELIST\_KYC$	2,205	0.375	0	0.484	0	1
NUM_OF_CURR	2,205	1.903	1	1.518	1	13
$FIAT$	2,205	0.020	0	0.140	0	1
$TEAM\_COUNT$	2,205	12.287	11	7.673	1	67
$PRICE\_ETH$	2,205	543.760	540.811	222.037	1.070	1,366.770

Note: This table presents the descriptive statistics for the variables included in both country-level and ICO-level analyses. The $AMOUNT\_RAISED$ variable does not include observations with zero USD raised, since ICOs that opt out from disclosing the amount raised is recorded as zeros. The $VOLATILITY$ measure represents the observations with at least 90 days of trading record. The $REGULATED$ variable does not include observations from 4 countries where ban on ICOs was introduced.

Table 4: Correlation Table

COUNTRY-LEVEL VARIABLES

	(1)	(2)	(3)	(4)	(5)
Dependent Variables					
(1) $NUMBER\_OF\_ICO$					
Independent Variables					
(2) $INSTITUTIONS$	0.33***				
(3) $REGULATED$	0.35***	0.48***			
Control Variables					
(4) TAX_HAVEN	0.17**	0.33***	0.23***		
(5) $POPULATION$	0.17**	-0.07	0.04	-0.09	
(6) $TERTIATY\_EDU$	0.32***	0.60***	0.38***	0.08	0.01

ICO-LEVEL VARIABLES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Dependent Variables															
(1) $SUCCESS$															
(2) $AMOUNT\_RAISED$	0.42***														
(3) $VOLATILITY$	-	-0.10**													
Dependent Variables															
(4) $INSTITUTIONS$	0.10***	0.10***	-0.10**												
(5) $REGULATED$	0.00	0.01	0.02	0.43***											
Control Variables															
(6) TAX_HAVEN	0.11***	0.11***	0.04	0.31***	0.28***										
(7) $RATING$	0.29***	0.25***	-0.05	0.08***	0.09***	0.14***									
(8) PRE_ICO	-0.07***	-0.04*	0.02	-0.02	0.07***	0.03	0.19***								
(9) $BONUS$	-0.08***	-0.04*	0.04	-0.01	0.04**	0.01	0.20***	0.19***							
(10) $CAPS\_PRESENT$	-0.02	0.01	0.01	0.03	0.14***	0.06***	0.30***	0.19***	0.21***						
(11) $ETHEREUM$	0.02	0.00	-0.07*	0.06***	0.02	0.05**	0.09***	0.05**	0.06***	0.09***					
(12) $WHITELIST\_KYC$	-0.06***	-0.02	0.07	0.15***	0.23***	0.19***	0.33***	0.16***	0.16***	0.27***	0.05**				
(13) NUM_OF_CURR	-0.03	0.03	0.10**	-0.06***	-0.02	-0.01	0.15***	0.13***	0.12***	0.11***	-0.17***	0.10***			
(14) $FIAT$	0.00	0.05**	-0.04	0.03	0.07***	0.03	0.05**	0.03	0.02	0.05**	0.00	0.10***	0.16***		
(15) $TEAM\_COUNT$	0.23***	0.25***	-0.01	0.07***	0.05**	0.14***	0.49***	0.14***	0.11***	0.19***	0.05**	0.23***	0.12***	0.03	
(16) $PRICE\_ETH$	-0.01	0.07***	-0.05	0.00	0.15***	0.03	0.03	0.12***	0.04*	0.13***	0.06***	0.03	0.05**	0.06***	0.07***

Note: This table presents two sets of correlation matrix: for country-level variables and ICO-level variables. The table shows Pearson correlation coefficients with significance levels 10 percent, 5 percent, and 1 percent denoted with *, ** and ***, respectively.

launched a pre-ICO sale and 45.4% of the ICOs offered some kind of bonus in the pre-sale or in the main ICO. Similar proportions were observed by Amsden and Schweizer [2018] and Adhami et al. [2018]. Furthermore, two-thirds (68.4%) of the ICOs specified either a soft or a hard cap. Strikingly, 88.3% of the ICOs were based on the Ethereum Blockchain. This prominence of Ethereum-based ICOs is consistent with other empirical studies on ICOs [Amsden and Schweizer, 2018; Fenu et al., 2018]. Similarly, we find one-third of the observations have complied with either or both Whitelist and KYC protocols (37.5%). On average, an ICO offers almost two (1.9) currency alternatives for investors to execute the token purchase, and 2% of the ICOs offer purchase with fiat currency as an option. Furthermore, we find that ICOs on average have approximately 12 team members and advisors onboard. The Ether prices fluctuated remarkably during our sample period, ranging from the lowest point of USD 1.07 to highest value of USD 1,366.77. The mean of average Ether price was USD 543.76.

Table 4 provides the estimated correlation coefficients between the variables included in our analyses. As hypothesized, we find a significant positive correlation between our measure of institutional strength and ICO frequency, probability of success and amount raise. We also find a highly significant and negative relationship between institutional strength and ICO token price volatility. We observe considerable correlation between the two success measures. In addition, we observe notable level of correlation between the socio-economic country-level variables, particularly institutions, ICO regulation and tertiary education enrollment. With regard to ICO-level variables, we observe some degree of correlation between ICObench ratings and other ICO attributes, particularly compliance with Whitelist and/or KYC protocols and the number of team members.

4.3 Multivariate Analysis

We conduct our analyses by using Generalized Linear Models (GLM). For our test relating to the number of ICOs, we use a negative binomial GLM. In the case of models relating to the success of ICOs, which is a dichotomous variable, we specify a binomial distribution. For the models looking at the impact on the amount raised and volatility, we specify Gamma distribution with a log-link [see e.g., Anglin, Short, Drover, Stevenson, McKenny, and Allison, 2018; Fisch, 2019]. The latter is particularly suitable for data that are continuous, strictly positive and right-skewed, and where variance is near constant on the log-scale [De Jong and Heller, 2008]. The measures of amount pledged and volatility share these attributes.[15]

Model 1 in Panel A of Table 5 reports the results for Hypothesis 1a. The analysis is conducted with a sample of 160 countries. We observe that a country's institutional background is significantly and positively related to the level of ICO activity. This result indicates that an increase in the aggregate institution score by one unit, with other variables held constant, would lead to an increase in the log of expected number of ICOs by 0.37. Among the control variables, we find significant results for tax-haven status, population and education variables.[16]

In Panel B, Models 2, 3 and 4 provide the results for the regressions with dependent variables $SUCCESS$, $AMOUNT\_RAISED$ and $VOLATILITY$, respectively. These results relate to Hypothesis 1a and 1b, which argue that stronger institutional conditions in the home country of ICO project is positively related to ICO performance and negatively to the volatility in the token price. The logistic regression (Model 2) is performed with 2,205 observations, which is the number of observations with complete information for all the variables. As the data on amount raised is not available for nearly half the ICOs, Model 3 includes only 1,140 observations. Lastly, in Model 4, the analysis is based on 513 ICOs that successfully issued their tokens and had price data for more than 90 days.

Among the control variables we include in the ICO-level analyses, we find some evidence showing

[15] Our results remain similar if we use the traditional least squares method (OLS).

[16] As a robustness check, we also conduct the analysis taking the dependent variable as the ratio of $NUMBER\_OF\_ICO$ and $POPULATION$, instead of introducing $POPULATION$ as a control. We observe that institutional background is still highly significant [p-value <= 0.01] despite having a population adjusted measure of ICO activity.

Table 5: Impact of Institutional Background on ICO Outcome

	Panel A	Panel B		
Dependent variable:	*NUMBER_OF_ICO*	*SUCCESS*	*AMOUNT_RAISED*	*VOLATILITY*
	GLM (Negative Binomial)	GLM (Binomial)	GLM (Log Gamma)	GLM (Log Gamma)
	(1)	(2)	(3)	(4)
Independent Variables:				
$INSTITUTIONS$	$\mathbf{0.373}^{***}$	$\mathbf{0.108}^{***}$	$\mathbf{0.085}^{***}$	$\mathbf{-0.126}^{***}$
	(0.122)	(0.031)	(0.023)	(0.046)
Control Variables:				
$POPULATION$	$\mathbf{0.551}^{***}$			
	(0.120)			
$TERTIARY\_EDUCATION$	$\mathbf{0.040}^{***}$			
	(0.007)			
TAX_HAVEN	$\mathbf{3.418}^{***}$	$\mathbf{0.340}^{***}$	0.046	0.094
	(0.739)	(0.126)	(0.088)	(0.195)
$RATING$		$\mathbf{1.322}^{***}$	$\mathbf{0.296}^{***}$	-0.234
		(0.104)	(0.087)	(0.150)
PRE_ICO		$\mathbf{-0.517}^{***}$	$\mathbf{-0.178}^{**}$	0.181
		(0.114)	(0.081)	(0.209)
$BONUS$		$\mathbf{-0.532}^{***}$	$\mathbf{-0.167}^{*}$	0.112
		(0.116)	(0.089)	(0.218)
$CAPS\_PRESENT$		$\mathbf{-0.351}^{***}$	$\mathbf{-0.204}^{**}$	0.002
		(0.125)	(0.100)	(0.197)
$ETHEREUM$		-0.009	0.035	-0.195
		(0.192)	(0.138)	(0.224)
$WHITELIST\_KYC$		$\mathbf{-1.003}^{***}$	$\mathbf{-0.267}^{***}$	0.289
		(0.134)	(0.097)	(0.217)
NUM_OF_CURR		$\mathbf{-0.092}^{**}$	-0.008	0.105
		(0.047)	(0.023)	(0.073)
$FIAT$		0.234	$\mathbf{0.523}^{**}$	-0.882
		(0.429)	(0.258)	(0.741)
$TEAM$		$\mathbf{0.044}^{***}$	$\mathbf{0.025}^{***}$	0.002
		(0.007)	(0.005)	(0.006)
$PRICE\_ETH$		0.000	$\mathbf{0.001}^{***}$	$\mathbf{-0.001}^{**}$
		(0.000)	(0.000)	(0.000)
(Intercept)	$\mathbf{-2.160}^{***}$	$\mathbf{-4.997}^{***}$	$\mathbf{14.601}^{***}$	0.416
	(0.525)	(0.383)	(0.275)	(0.494)
Num. obs.	160	2205	1140	513
AIC	758.356	2119.192	39020.188	150.724
Log Likelihood	-373.178	-1046.596	-19496.094	-61.362

Note: This table presents the results for the models relating to Hypothesis 1a and 1b, investigating the impact of institutional strength on the number of ICOs, ICO success and uncertainty. Model (1) in Panel A relates to the number of ICOs ($NUMBER\_OF\_ICO$), while Model (2) and (3) in Panel B relates to $SUCCESS$ and $AMOUNT$, respectively. Model (4) in Panel B tests Hypothesis 1c and estimates the impact of institutions on token price volatility ($VOLATILITY$). The variables are defined in Table 2. *, ** and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test.

that ICOs based in locations considered tax havens are significantly more likely to be successful. However, this relationship is not robust in terms of its impact on the amount raised. In addition, our results

mostly corroborate with other recent empirical studies on ICOs. With regard to ICO success, similar to Fenu et al. [2018], we find that ICOBench rating has a highly significant positive relationship, indicating that these ratings do influence funders' decision. We obtain significant but negative coefficients for pre-ICO, bonus, caps and whitelist/KYC dummy variables, suggesting that having a pre-ICO sale, offering bonuses, specifying either soft or hard cap, or compliance with whitelist/KYC protocol are rather detrimental to the ICO's outcome. Similar to the findings of Amsden and Schweizer [2018] and Cerchiello et al. [2018], we also observe a positive relationship between team size and ICO success. In addition, the results suggest that there is a negative relationship between the number of currency choices offered to investors and the ICO's success. We find that the dollar amount raised is positively associated with the contemporaneous Ether prices. With respect to volatility, we also find that average Ether prices during the ICO has significantly negative impact on the price volatility. Overall, estimates for various control variables are largely consistent between Model 2 and 3, but in relation to volatility, most variables seem to be insignificant.

With respect to the main variable, i.e. institutional strength, the regression results in Panel B of Table 5 show that there is indeed a strong and significant relationship between institutional background of the ICO's country of origin ($INSTITUTION$) and their outcome, in terms of both the probability of being traded in a secondary market ($SUCCESS$) and the amount raised ($AMOUNT$) [p-value: <0.01]. In order to interpret the results, we calculate the increase in the outcome variable consequent of a marginal increase of one unit of institution measure from the mean, while holding the continuous control variables constant at mean, and the dummy variables at one. From Model 2, we observe that an increase of aggregate institution score by 1 unit is associated with an increase in the probability of ICO success increases by 1.03%. Similarly, we find that an increase of aggregate institution score by one unit from the mean institution score appreciates the amount raised by approximately USD 0.9 million. Furthermore, our results suggest that an increase of institution score by one unit from the mean reduces the volatility by [-]0.040. The results indicate that there is indeed a negative relationship between the institutional background of the jurisdiction in which the ICO is launched and the consequent volatility in the price of issued token, given the tokens are traded in a secondary market.

Table 6 provides the results relating to the analyses on the interaction of regulatory status on ICOs with the institutional effect (Hypotheses 2a and 2b). In total, we identify 22 countries as having some ICO-related regulation, 134 countries without any regulatory stance, and 4 countries that introduced prohibitions on ICOs (as per the regulatory status prior to September 2018, the last month in our sample). Similarly, we find 725 ICOs in regulated countries, 1,451 ICOs located in countries without ICO regulations, and 29 ICOs in banned countries. In the ICO-level analyses, the regulatory status is assigned to each ICO observation based on the ICO's date of launch, i.e. ICOs that were launched before the introduction of the respective ICO regulation are designated to the second group. In the country-level analysis, we drop the countries that introduced a ban on ICOs, and in the ICO-level analyses, any record of ICO launched during the time when a ban was in effect is not considered.

Consistent with Hypothesis 2a, Panel A of Table 6 shows that the interaction variable between a country's institutional strength and its regulation on ICO is negative and significant at a 1% confidence level. This result suggests that the influence of a country's institutions is particularly relevant in countries where there is little or no regulation relating ICOs. In Panel B, we also observe such a substitutive effect for the amount raised, but find no significance in the interaction variable for the probability of success (Model 2) and the token price volatility (Model 3). Also note that the regulation variable ($REGULATED$) is insignificant for all models, but for the amount raised, where it is positive and significant at a 90% level. Nonetheless, the effect of institutional background on all four dependent variables remains highly significant.

4.4 Robustness Tests

We further incorporate additional robustness checks to validate our findings. First, as 17% of the ICOs in our sample were based in the US, we conduct our analyses with a sample excluding ICOs

based in the US. Our findings, as shown in Table 7, are still significant and the signs remain consistent even after the exclusion. However, we observe that the significance level of the results decrease to 5% and 10% for Model 2 and 3, respectively. Second, we use alternative measures of institutional development based on Corruption Perception Index (CPI) for the year 2018 and composite measure of institutional dimensions from La Porta, Lopez-de Silanes, Shleifer, and Vishny [1999]; La Porta et al. [1998]. CPI scores represent the perceived levels of public sector corruption according to experts and businesspeople in a scale from 0 to 100, 0 being the most corrupt. We also employ the dimensions identified by La Porta et al. [1999, 1998]: (i) an anti-director rights index, (ii) an index for the rule of law, (ii) an index for the level of corruption, and (iv) an index of the legal system's efficiency, and take the first principal component to create a unified measure. Our results remain consistent and highly significant when we use the CPI index, but the evidence weakens with the La Porta et al. [1999, 1998] composite measure. Third, we look at the impact of each World Bank Governance Indicator individually. We find that results for 'Cost of Corruption', 'Governance Effectiveness', 'Regulatory Quality' and 'Rule of Law' are particularly significant with regard to all three outcome variables. With 'Political Stability' variable, only the result in terms of ICO activity and probability of success remains significant and positive. Furthermore, the coefficient for 'Voice and Accountability' is not significant in determining ICO success. Furthermore, the coefficients for institution variable remains significant and consistent even when including $POPULATION$ and $TERTIARY\_EDUCATION$ control variables in the ICO-level analyses.

Lastly, we investigate if our results hold for two alternative measures of token price volatility. First, we simply take the standard deviation of the daily returns (STD_RET), a method commonly used in measuring volatility of commodity prices [Fleming and Ostdiek, 1999; Regnier, 2007; Slade, 1991]. Second, we use realized volatility, ($REAL\_VOL$), which is computed as the sum of squared returns. It was introduced by Andersen and Bollerslev [1998], arguing that under appropriate conditions it is an unbiased and highly efficient estimator of volatility [Andersen, Bollerslev, Diebold, and Labys, 2003; Barndorff-Nielsen and Shephard, 2002]. Our results concerning the relationship between institutional background and price volatility is consistently and significantly negative, supporting the main findings. The estimated coefficients for both the measures are significant at 5% level.

5 Conclusion

Based on a sample of about 2,200 ICOs from 105 countries, we draw on institutional theory and provide evidence of an international heterogeneity in ICO frequency, success and risk. More specifically, building on the heightened information asymmetry surrounding ICOs and the generally weak regulations concerning cryptocurrencies, our findings indicate that ICOs located in countries with a stronger institutional framework are more frequent, raise more capital, have a higher likelihood of becoming a traded token, and enjoy a substantially lower token price volatility. We further find that the positive influence of institutions is especially prevalent for countries where ICOs are lightly or not regulated. We interpret these results as being consistent with our hypotheses that a country's institutions increase investors' trust in ICOs, and that this effect is especially prevalent for countries where ICOs are lightly or not regulated. We find that the importance of institutions remains robust for alternative institutional definitions, sample selection and volatility specifications.

Altogether, the bottom-line of our results suggests that the heterogeneity in ICO success across the world can be explained by investors relying on alternative cues to infer trust and assess the riskiness associated with ICOs. Our evidence is important for policymakers who need to establish their future approach and policies towards ICOs. Nonetheless, ICOs are still in its early phase, and there is still a lot to be understood in terms of what determines its adoption and its success. As with the introduction of any new promising technology, speculative exuberance and hasty aversion has hindered its rational assessment. The process of learning to optimize the value that ICO offers to the public still requires more experience, a more proactive effort on the authorities' part and more research. In fact, future research should continue investigating the determinants of ICO development and the factors that mit-

Table 6: Impact of Institutional Background & ICO Regulations on ICO Outcome

	Panel A	Panel B		
Dependent variable:	*NUMBER_OF_ICO*	*SUCCESS*	*AMOUNT_RAISED*	*VOLATILITY*
	GLM (Negative Binomial)	GLM (Binomial)	GLM (Log Gamma)	GLM (Log Gamma)
	(1)	(2)	(3)	(4)
Independent Variables:				
$INSTITUTIONS$	$\mathbf{0.480}^{***}$	$\mathbf{0.143}^{***}$	$\mathbf{0.104}^{***}$	$\mathbf{-0.133}^{***}$
	(0.149)	(0.036)	(0.027)	(0.050)
$REGULATED$	0.338	-0.173	$\mathbf{0.509}^{*}$	0.431
	(0.429)	(0.409)	(0.278)	(1.239)
$INSTITUTIONS$ x $REGULATED$	$\mathbf{-0.455}^{***}$	-0.014	$\mathbf{-0.171}^{**}$	-0.090
	(0.160)	(0.115)	(0.078)	(0.320)
Control Variables:				
$POPULATION$	$\mathbf{0.612}^{***}$			
	(0.107)			
$TERTIARY\_EDUCATION$	$\mathbf{0.040}^{***}$			
	(0.008)			
TAX_HAVEN	$\mathbf{3.798}^{***}$	$\mathbf{0.403}^{***}$	0.112	0.081
	(0.623)	(0.132)	(0.097)	(0.197)
$RATING$		$\mathbf{1.356}^{***}$	$\mathbf{0.318}^{***}$	-0.222
		(0.106)	(0.091)	(0.155)
PRE_ICO		$\mathbf{-0.523}^{***}$	$\mathbf{-0.183}^{**}$	0.156
		(0.115)	(0.081)	(0.208)
$BONUS$		$\mathbf{-0.514}^{***}$	$\mathbf{-0.163}^{*}$	0.152
		(0.118)	(0.091)	(0.222)
$CAPS\_PRESENT$		$\mathbf{-0.364}^{***}$	$\mathbf{-0.218}^{**}$	-0.044
		(0.127)	(0.105)	(0.201)
$ETHEREUM$		0.046	0.048	-0.245
		(0.197)	(0.143)	(0.230)
$WHITELIST\_KYC$		$\mathbf{-1.051}^{***}$	$\mathbf{-0.278}^{***}$	0.284
		(0.138)	(0.102)	(0.217)
NUM_OF_CURR		$\mathbf{-0.082}^{*}$	-0.004	0.095
		(0.046)	(0.024)	(0.074)
$FIAT$		0.145	$\mathbf{0.562}^{**}$	-0.770
		(0.445)	(0.261)	(0.766)
$TEAM$		$\mathbf{0.042}^{***}$	$\mathbf{0.025}^{***}$	0.003
		(0.008)	(0.005)	(0.007)
$PRICE\_ETH$		-0.000	$\mathbf{0.001}^{***}$	$\mathbf{-0.001}^{*}$
		(0.000)	(0.000)	(0.000)
(Intercept)	$\mathbf{-2.292}^{***}$	$\mathbf{-5.170}^{***}$	$\mathbf{14.508}^{***}$	0.426
	(0.510)	(0.395)	(0.287)	(0.508)
Num. obs.	156	2176	1122	503
AIC	734.123	2071.251	38398.629	153.492
Log Likelihood	-359.061	-1020.626	-19183.314	-60.746

Note: This table presents the results for the models relating to Hypothesis 2a and 2b, investigating the moderating role of ICO regulations on the impact of institutions on ICO activity and outcome, respectively. Model (1) in Panel A relates to analysis on $NUMBER\_OF\_ICO$, and Models (2), (3) in Panel B relate to analysis of $SUCCESS$ and $AMOUNT$. Model (4) in Panel B tests Hypothesis 2c and estimates the impact of institutions and ICO regulation on token price volatility ($VOLATILITY$). The variables are defined in Table 2. *, ** and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test.

Table 7: Robustness Test: Using Corruption Perception Index measure of Institutional Background

Dependent variable:	*NUMBER_OF_ICO*	*SUCCESS*	*AMOUNT_RAISED*	*VOLATILITY*
	GLM (Negative Binomial)	GLM (Binomial)	GLM (Log Gamma)	GLM (log Gamma)
	(1)	(2)	(3)	(4)
Excluding United States-based ICOs				
$INSTITUTIONS$	$\mathbf{0.371}^{***}$	$\mathbf{0.076}^{**}$	$\mathbf{0.042}^{*}$	$\mathbf{-0.112}^{**}$
	(0.124)	(0.033)	(0.022)	(0.052)
Alternative Institution Measures				
$INSTITUTION\ (CPIIndex)$	$\mathbf{0.041}^{***}$	$\mathbf{0.009}^{**}$	$\mathbf{0.007}^{***}$	$\mathbf{-0.015}^{***}$
	(0.013)	(0.003)	(0.002)	(0.005)
$INSTITUTIONS\ (LaPorta)$	$\mathbf{0.737}^{***}$	$\mathbf{0.201}^{**}$	0.038	$\mathbf{-0.296}^{**}$
	(0.117)	(0.080)	(0.053)	(0.126)
World Bank Governance Indicators				
$COST\_OF\_CORRUPTION$	$\mathbf{0.647}^{***}$	$\mathbf{0.180}^{***}$	$\mathbf{0.122}^{***}$	$\mathbf{-0.232}^{**}$
	(0.219)	(0.062)	(0.042)	(0.097)
$GOVERNANCE\_EFFECTIVENESS$	$\mathbf{0.936}^{***}$	$\mathbf{0.287}^{***}$	$\mathbf{0.178}^{***}$	$\mathbf{-0.263}^{**}$
	(0.250)	(0.080)	(0.054)	(0.122)
$POLITICAL\_STABILITY$	$\mathbf{0.425}^{*}$	$\mathbf{0.294}^{***}$	0.096	-0.276
	(0.236)	(0.101)	(0.069)	(0.168)
$REGULATORY\_QUALITY$	$\mathbf{0.875}^{***}$	$\mathbf{0.202}^{***}$	$\mathbf{0.137}^{***}$	$\mathbf{-0.231}^{**}$
	(0.292)	(0.068)	(0.046)	(0.106)
$RULE\_OF\_LAW$	$\mathbf{0.677}^{**}$	$\mathbf{0.229}^{***}$	$\mathbf{0.159}^{***}$	$\mathbf{-0.250}^{**}$
	(0.274)	(0.066)	(0.044)	(0.101)
$VOICE\_AND\_ACCOUNTABILITY$	$\mathbf{0.723}^{***}$	0.082	$\mathbf{0.106}^{**}$	$\mathbf{-0.221}^{**}$
	(0.258)	(0.066)	(0.044)	(0.098)
Including $POPULATION$ ***and*** $TERTIARY\_EDUCATION$ ***in the set of control variables***				
$INSTITUTIONS$		$\mathbf{0.103}^{***}$	$\mathbf{0.112}^{***}$	$\mathbf{-0.105}^{**}$
		(0.037)	(0.026)	(0.052)

	Dependent variable:	
	SD Daily Returns	*Realized Volatility*
	GLM (Log Gamma)	GLM (log Gamma)
	(1)	(2)
Alternative Volatility Measures (Dependent Variable)		
$INSTITUTIONS$	$\mathbf{-0.030}^{**}$	$\mathbf{-0.025}^{**}$
	(0.012)	(0.012)

Note: This table presents the estimated coefficients for the main variable of focus, institutional background, obtained from the various robustness tests discussed in Section 4.5. The first set of results relates to the impact of institutions on ICO success and return volatility, when US-based ICOs are excluded. The second set provides estimated coefficients for alternative institution measures: Corruption Perception Index (CPI), La Porta et al. [1998, 1999] and individual World Bank Governance Indicators. The third set provides the estimated coefficients when alternative Token Price Volatility measures, namely Standard Deviation and Realized Volatility, are used as the dependent variable. The variables are defined in Table 2. *, ** and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively, based on a two-sided t-test.

igate the potential risks; determinants that could help in the wider adoption of ICOs, and to better understand their role in entrepreneurial development and economic growth.

References

Adhami, S., G. Giudici, and S. Martinazzi (2018). Why do businesses go crypto? An empirical analysis of initial coin offerings. *Journal of Economics and Business 100*, 64–75.

Aghion, P., a. C. P. Algan, Y., and A. Shleifer (2010). Regulation and distrust. *Q. J. Econ. 125*(3), 1015–1049.

Aldrich, H. E. and C. M. Fiol (1994). Fools rush in? The institutional context of industry creation. *Academy of management review 19*(4), 645–670.

Amsden, R. and D. Schweizer (2018). Are Blockchain Crowdsales the New'Gold Rush'? Success Determinants of Initial Coin Offerings. *Available at SSRN 3163849*.

Andersen, T. G. and T. Bollerslev (1998). Answering the skeptics: Yes, standard volatility models do provide accurate forecasts. *International economic review*, 885–905.

Andersen, T. G., T. Bollerslev, F. X. Diebold, and P. Labys (2003). Modeling and forecasting realized volatility. *Econometrica 71*(2), 579–625.

Anglin, A. H., J. C. Short, W. Drover, R. M. Stevenson, A. F. McKenny, and T. H. Allison (2018). The power of positivity? The influence of positive psychological capital language on crowdfunding performance. *Journal of Business Venturing 33*(4), 470–492.

Arrow, K. J. (1973). Higher education as a filter. *Journal of Pu. Econ. 2*(3), 193–216.

Bachmann, R. and A. C. Inkpen (2011). Understanding institutional-based trust building processes in inter-organizational relationships. *Organization Studies 32*(2), 281–301.

Bariviera, A. F., M. J. Basgall, W. Hasperué, and M. Naiouf (2017). Some stylized facts of the Bitcoin market. *Physica A: Statistical Mechanics and its Applications 484*, 82–90.

Barndorff-Nielsen, O. E. and N. Shephard (2002). Econometric analysis of realized volatility and its use in estimating stochastic volatility models. *Journal of the Royal Statistical Society: Series B (Statistical Methodology) 64*(2), 253–280.

Baum, J. A. C. and B. S. Silverman (2004). Picking winners or building them? Alliance, intellectual, and human capital as selection criteria in venture financing and performance of biotechnology startups. *Journal of business venturing 19*(3), 411–436.

Bell, G. R., C. B. Moore, and H. A. Al-Shammari (2008). Country of origin and foreign IPO legitimacy: Understanding the role of geographic scope and insider ownership. *Entr. Theory & Pract. 32*(1), 185–202.

Bittlingmayer, G. (2000). Regulatory uncertainty and investment: evidence from antitrust enforcement. *Cato J. 20*, 295.

Bruton, G. D., D. Ahlstrom, and H.-L. Li (2010). Institutional theory and entrepreneurship: where are we now and where do we need to move in the future? *Entrepreneurship theory and practice 34*(3), 421–440.

Cambini, C. and Y. Jiang (2009). Broadband investment and regulation: A literature review. *Telecommunications Policy 33*(10-11), 559–574.

Carlin, B. I., F. Dorobantu, and S. Viswanathan (2009). Public trust, the law, and financial investment. *J. Fin. Econ. 92*(3), 321–341.

Cerchiello, P., A. M. Toma, and Others (2018). ICOs success drivers: a textual and statistical analysis. *University of Pavia, Department of Economics and Management* (164).

Chortareas, G. E., C. Girardone, and A. Ventouri (2013). Financial freedom and bank efficiency: Evidence from the European Union. *Journal of Banking & Finance 37*(4), 1223–1231.

Chu, J., S. Chan, S. Nadarajah, and J. Osterrieder (2017). GARCH modelling of cryptocurrencies. *Journal of Risk and Financial Management 10*(4), 17.

Coase, R. H. (2012). *The firm, the market, and the law*. University of Chicago press.

Dahlstrom, R. and A. Nygaard (1995). An exploratory investigation of interpersonal trust in new and mature market economies. *Journal of retailing 71*(4), 339–361.

De Jong, P. and G. Z. Heller (2008). Generalized linear models for insurance data. Technical report, Cambridge University Press.

DiMaggio, P. and W. Powell (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *Am. Soc. Rev. 48*(2), 147–160.

Elbahnasawy, N. G. (2014). E-government, internet adoption, and corruption: an empirical investigation. *World Development 57*, 114–126.

Engle, R. (2001). GARCH 101: The use of ARCH/GARCH models in applied econometrics. *Journal of economic perspectives 15*(4), 157–168.

Fan, L., B. F. Hobbs, and C. S. Norman (2010). Risk aversion and CO2 regulatory uncertainty in power generation investment: Policy and modeling implications. *Journal of Environmental Economics and Management 60*(3), 193–208.

Felix, T. H. and H. von Eije (2019). Underpricing in the cryptocurrency world: evidence from initial coin offerings. *Managerial Finance 45*(4), 563–578.

Fenu, G., L. Marchesi, M. Marchesi, and R. Tonelli (2018). The ICO phenomenon and its relationships with ethereum smart contract environment. In *2018 International Workshop on Blockchain Oriented Software Engineering (IWBOSE)*, pp. 26–32. IEEE.

Fisch, C. (2019). Initial coin offerings (ICOs) to finance new ventures. *Journal of Business Venturing 34*(1), 1–22.

Fleming, J. and B. Ostdiek (1999). The impact of energy derivatives on the crude oil market. *Energy Economics 21*(2), 135–167.

Gani, A. (2007). Governance and foreign direct investment links: evidence from panel data estimations. *Applied economics letters 14*(10), 753–756.

Globerman, S. and D. Shapiro (2002). Global foreign direct investment flows: The role of governance infrastructure. *World development 30*(11), 1899–1919.

Guiso, L., P. Sapienza, and L. Zingales (2008). Trusting the stock market. *J. Fin. 63*, 2557–2600.

Hadani, M., J.-P. Bonardi, and N. M. Dahan (2017). Corporate political activity, public policy uncertainty, and firm outcomes: A meta-analysis. *Strategic Organization 15*(3), 338–366.

Hines, J. R. (2010). Treasure islands. *Journal of Economic Perspectives 24*(4), 103–126.

Hooper, V., A. B. Sim, and A. Uppal (2009). Governance and stock market performance. *Econ. Sys. 33*(2), 93–116.

Howell, S. T., M. Niessner, and D. Yermack (2018). Initial coin offerings: Financing growth with cryptocurrency token sales. Technical report, National Bureau of Economic Research.

Huang, W., M. Meoli, and S. Vismara (2019). The geography of initial coin offerings. *Small Business Economics Forthcoming*.

Johnson, S., J. McMillan, and C. Woodruff (2002). Property rights and finance. *American Economic Review 92*(5), 1335–1356.

Katsiampa, P. (2017). Volatility estimation for Bitcoin: A comparison of GARCH models. *Economics Letters 158*, 3–6.

Kaufmann, D., A. Kraay, and M. Mastruzzi (2010). The worldwide governance indicators: A summary of methodology. *Data and Analytical Issues, World Bank Policy Research Working Paper 5430*.

Kirkpatrick, C., D. Parker, and Y.-F. Zhang (2004). Foreign direct investment in infrastructure in developing countries: does regulation make a difference? Technical report.

Klein, T., H. P. Thu, and T. Walther (2018). Bitcoin is not the New Gold–A comparison of volatility, correlation, and portfolio performance. *International Review of Financial Analysis 59*, 105–116.

Knack, S. and P. Keefer (1997). Does social capital have an economic payoff? a cross-country investigation. *Q. J. Econ. 112*(4), 1251–1288.

Kotakorpi, K. (2006). Access price regulation, investment and entry in telecommunications. *International Journal of Industrial Organization 24*(5), 1013–1020.

La Porta, R., F. Lopez-de Silanes, and A. Shleifer (2006). What works in securities laws? *J. Fin. 61*, 1–32.

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. Vishny (1998). Law and finance. *J. Pol. Econ. 106*(6), 1113–1155.

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. Vishny (1999). The quality of government. *The Journal of Law, Economics, and Organization 15*(1), 222–279.

La Porta, R., F. Lopez-de Silanes, A. Shleifer, and R. W. Vishny (1998). Law and finance. *Journal of political economy 106*(6), 1113–1155.

Li, Y. and S. A. Zahra (2012). Formal institutions, culture, and venture capital activity: A cross-country analysis. *Journal of Business Venturing 27*(1), 95–111.

Low, S. W., S. R. Kew, and L. T. Tee (2011). International evidence on the link between quality of governance and stock market performance. *G. Econ. Rev. 40*(3), 361–384.

McMullen, J. S., D. R. Bagby, and L. E. Palich (2008). Economic freedom and the motivation to engage in entrepreneurial action. *Entrepreneurship Theory and Practice 32*(5), 875–895.

Momtaz, P. P. (2018). Ceo emotions and underpricing in initial coin offerings. *Available at SSRN 3305765*.

North, D. C. (1981). *Structure and change in economic history*. Norton.

North, D. C. (1991). Institutions. *Journal of economic perspectives 5*(1), 97–112.

Palan, R. (2009). The history of tax havens. *History & Policy*.

Peltzman, S. (1976). Toward a more general theory of regulation. *The Journal of Law and Economics 19*(2), 211–240.

Phillip, A., J. S. K. Chan, and S. Peiris (2018). A new look at Cryptocurrencies. *Economics Letters 163*, 6–9.

Regnier, E. (2007). Oil and energy price volatility. *Energy economics 29*(3), 405–427.

Scarbrough, H., J. Swan, K. Amaeshi, and T. Briggs (2013). Exploring the role of trust in the deal–making process for early–stage technology ventures. *Entrepreneurship Theory and Practice 37*(5), 1203–1228.

SEC (2018). Executives settle ico scam charges. Online at https://www.sec.gov/news/press-release/2018-280; accessed 14/03/2019.

Shaffer, B. (1995). Firm-level responses to government regulation: Theoretical and research approaches. *Journal of Management 21*(3), 495–514.

Shan, W., J. V. Singh, and T. L. Amburgey (1991). Modeling the creation of new biotechnology firms, 1973-1987. In *Academy of Management Proceedings*, Volume 1991, pp. 78–82. Academy of Management Briarcliff Manor, NY 10510.

Slade, M. E. (1991). Market structure, marketing method, and price instability. *The Quarterly Journal of Economics 106*(4), 1309–1340.

Staats, J. L. and G. Biglaiser (2012). Foreign direct investment in Latin America: The importance of judicial strength and rule of law. *International Studies Quarterly 56*(1), 193–202.

Stephan, U., L. M. Uhlaner, and C. Stride (2015). Institutions and social entrepreneurship: The role of institutional voids, institutional support, and institutional configurations. *Journal of International Business Studies 46*(3), 308–331.

Teisberg, E. O. (1993). Capital investment strategies under uncertain regulation. *The RAND Journal of Economics*, 591–604.

Yang, B., N. D. Burns, and C. J. Backhouse (2004). Management of uncertainty through postponement. *International Journal of Production Research 42*(6), 1049–1064.

Zacharakis, A. L. and G. D. Meyer (2000). The potential of actuarial decision models: can they improve the venture capital investment decision? *Journal of Business Venturing 15*(4), 323–346.

Zucker, L. G. (1986). Production of trust: Institutional sources of economic structure, 1840-1920. *Research in organizational behavior 8*, 53–111.

6 Appendix

Table 8: Status of ICO Regulation

Country	Regulatory Status	Detail	Month
Afghanistan	Unregulated	Considering sovereign crypto bond.[17]	Apr-19
Andorra	Unregulated	No regulation, but warnings issued.[18]	Sep-18
Anguilla	Regulated	Anguilla Utility Token Act or 'AUTO Act' defines and regulates utility tokens that do not have a feature of a security.[19]	May-18
Argentina	Unregulated	No regulation, issued warnings in relation to Bitcoins.[20]	May-14
Armenia	Unregulated	No information appears to be available.	Mar-18
Australia	Regulated	Issued guidance for ICOs regarding legal obligations when offering coins or tokens.[21]	Sep-17
Austria	Regulated	Published guidelines on how it views ICOs from a financial services regulatory perspective.[22]	Oct-18
Bahamas	Unregulated	No legislation specifically for ICOs, but the central bank stated that regulations for a system of national electronic payments services also applies to cryptocurrencies.[23]	Mar-18
Bangladesh	Unregulated	Banned the use of Bitcoin.[24]	Dec-17
Barbados	Unregulated	The central bank and the Financial Services Commission (FSC) established a Regulatory Sandbox to test feasibility of fintech innovations.[25]	Oct-18
Belarus	Regulated	The presidential decree on the development of the digital economy regulates taxation and foreign exchange control relating to cryptocurrencies, and enables legal environment for ICOs.[26]	Mar-18
Belgium	Regulated	Issued guideline identifying a number of national and European laws that may apply to some ICOs.[27]	Nov-17
Belize	Unregulated	No information appears to be available.	-
Bosnia and Herzegovina	Unregulated	The central bank stated that there were no plans to limit tradings in virtual currencies.[28]	Jan-18
Brazil	Regulated	Issued a statement on ICOs, and indicated that ICO tokens that meet the definition of securities must meet the criteria outlined in the Securities Act.[29]	Mar-18
Bulgaria	Unregulated	Financial Service Commission monitors the market for cryptocurrencies and ICOs, mainly in relation to money laundering and other abuses.[30]	Jul-18
Cambodia	Unregulated	No regulation, issued warnings in relation to Bitcoins.[31]	Dec-17
Canada	Regulated	Issued statement specifying that ICOs may be subject to the laws adopted by the Canadian securities regulatory authorities, including trade reporting rules.[32]	Aug-17
Cayman Islands	Unregulated	No information appears to be available.	-
Chile	Unregulated	No information appears to be available.	-
China	Banned	Seven central government regulators jointly issued the 'Announcement on Preventing Financial Risks from Initial Coin Offerings', banning ICOs in China.[33]	Sep-17

[17] https://www.asiatimes.com/2019/04/article/kabul-tunis-in-sovereign-crypto-bond-race/
[18] https://www.afa.ad/en/coneix-lafa/actualitat-afa/alertes/afa-advertencia-2018-03-09
[19] https://anguillafinance.ai/utility-token-offering/?s=
[20] https://www.infotechnology.com/internet/El-Banco-Central-argentino-considera-riesgoso-operar-con-bitcoins-20140528-0003.html
[21] https://asic.gov.au/about-asic/news-centre/find-a-media-release/2017-releases/17-325mr-asic-provides-guidance-for-initial-coin-offerings/
[22] https://www.fma.gv.at/en/fma-spotlight-on/fma-focus-initial-coin-offerings/
[23] https://www.centralbankbahamas.com/download/031486300.pdf
[24] http://www.dhakatribune.com/business/banks/2017/12/27/bangladesh-bank-ban-bitcoin/
[25] http://www.centralbank.org.bb/regulatory-sandbox/sandbox-news/article/9432/central-bank-of-barbados-and-financial-services-commission-announce-the-establi
[26] https://www.belarus.by/en/press-center/news/belarus-digital-economy-development-ordinance-comes-into-force_i_0000076762.html
[27] https://www.fsma.be/sites/default/files/public/content/EN/Circ/fsma_2017_20_en.pdf
[28] https://vijesti.ba/clanak/389130/o-kriptovalutama-se-potrebno-detaljno-informirati-ulozeni-novac-nije-osiguran
[29] http://www.cvm.gov.br/subportal_ingles/menu/international/ico_statement.html
[30] https://www.esma.europa.eu/sites/default/files/library/esma22-106-1338_smsg_advice_-_report_on_icos_and_crypto-assets.pdf
[31] https://www.khmertimeskh.com/94114/bitcoin-risky-business-nbc-warns/
[32] https://www.osc.gov.on.ca/en/SecuritiesLaw_csa_20170824_cryptocurrency-offerings.htm
[33] http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3374222/index.html

Colombia	Unregulated	Introduced prohibition on financial institutions.[34]	Jun-17
Congo	Unregulated	No information appears to be available.	-
Costa Rica	Unregulated	No regulation, but provided statement on cryptocurrencies.[35]	Oct-17
Croatia	Unregulated	No regulation, but statement provided on cryptocurrencies.[36]	Sep-17
Curaçao	Unregulated	No information appears to be available.	-
Cyprus	Unregulated	No regulation, but warnings about virtual currencies have been issued to investors.[37]	Feb-14
Czech Republic	Unregulated	Amendments made to anti-money laundering legislation in relation to virtual currency service providers.[38]	Nov-16
Denmark	Regulated	No specific rules but current laws remain applicable subject to design of the ICO.[39]	Nov-17
Ecuador	Unregulated	Issued warning in relation to the use of Bitcoins.[40]	Jan-18
Estonia	Regulated	ICOs in Estonia are regulated by the applicable laws, particularly by Securities Market Act, Consumer Protection Act, Money Laundering and Terrorist Financing Prevention Act.[41]	Sep-18
Finland	Regulated	Given a ICO token is considered a security, regulation applicable to issuing a security applies.[42]	Nov-17
France	Unregulated	Prepared and adopted a draft bill (PACTE) which establishes legal framework for ICOs.[43]	Apr-19
Georgia	Unregulated	No regulation, but warnings issued.[44]	Dec-17
Germany	Regulated	Guidelines issued in relation to application of current laws to ICOs.[45]	Mar-18
Ghana	Unregulated	Does not acknowledge any online currency and has expressed concerns.[46]	Feb-18
Gibraltar	Regulated	Introduced Financial Services (Distributed Ledger Technology Providers) Regulations 2017.[47]	Jan-18
Greece	Unregulated	No regulation, but warnings issued.[48]	Feb-18
Guernsey and Jersey	Regulated	Published ICO guidelines, allowing ICOs with relaxed regulatory framework.[49]	Jul-18
Guinea-Bissau	Unregulated	No information appears to be available.	-
Hong Kong	Regulated	Issued a statement that digital tokens may be classified as securities as defined by the Securities and Futures Ordinance (SFO).[50]	Sep-17
Hungary	Unregulated	No regulation, but warnings issued.[51]	Dec-17
India	Unregulated	Prohibits regulated financial institutions from dealing with virtual currencies.[52]	Apr-18
Indonesia	Unregulated	No regulation, but issued warnings on virtual currencies.[53]	Jan-18

[34] https://actualicese.com/carta-circular-52-de-22-06-2017/
[35] https://www.bccr.fi.cr/seccion-noticias/Noticia/Posicion_bccr_criptomonedas.aspx
[36] https://www.hnb.hr/-/moguci-rizici-povezani-s-ulaganjima-u-virtualne-valute?inheritRedirect=true&redirect=https%3A%2F%2Fwww.hnb.hr%2Fpretraga%3Fp_p_id%3Dcom_liferay_portal_search_web_portlet_
[37] https://www.centralbank.cy/en/announcements/07022014
[38] https://www.zakonyprolidi.cz/cs/2016-368
[39] https://www.dfsa.dk/en/News/Press-releases/2018/Ico-statement-131117
[40] https://www.bce.fin.ec/index.php/boletines-de-prensa-archivo/item/1028-comunicado-oficial-sobre-el-uso-del-bitcoin
[41] https://www.fi.ee/en/investment/aktuaalsed-teemad-investeerimises/virtuaalraha-ico/legal-framework-initial-coin-offering-estonia
[42] https://www.finanssivalvonta.fi/en/banks/fintech–financial-sector-innovations/virtuaalivaluutan-tarjoajat/frequently-asked-questions-on-virtual-currencies-and-their-issuance-initial-coin-offering/
[43] https://www.amf-france.org/en_US/Reglementation/Dossiers-thematiques/Fintech/Vers-un-nouveau-regime-pour-les-crypto-actifs-en-France
[44] https://www.nbg.gov.ge/index.php?m=340&newsid=3247&lng=geo
[45] https://www.bafin.de/SharedDocs/Downloads/EN/Merkblatt/WA/dl_hinweisschreiben_einordnung_ICOs_en.html
[46] https://www.bog.gov.gh/privatecontent/Public_Notices/Digital%20and%20Virtual%20Currencies%20Operations%20in%20Ghana.pdf
[47] http://www.gfsc.gi/uploads/DLT%20regulations%20121017%20(2).pdf
[48] https://www.bankofgreece.gr/Pages/el/Bank/News/Announcements/DispItem.aspx?Item_ID=5981&List_ID=1af869f3-57fb-4de6-b9ae-bdfd83c66c95
[49] https://www.jerseyfsc.org/media/2003/2018-07-12_jfsc-issues-ico-guidance-note.pdf
[50] https://www.sfc.hk/web/EN/news-and-announcements/policy-statements-and-announcements/statement-on-initial-coin-offerings.html
[51] https://www.mnb.hu/sajtoszoba/sajtokozlemenyek/2017-evi-sajtokozlemenyek/rendkivuli-kockazatot-hordoznak-az-ico-befektetesek
[52] https://www.rbi.org.in/scripts/NotificationUser.aspx?Mode=0&Id=11243
[53] https://www.bi.go.id/en/ruang-media/siaran-pers/Pages/sp_200418.aspx

Ireland	Unregulated	No official position but in a recent policy speech included the issue of regulation of ICOs.[54]	Jan-18
Isle Of Man	Regulated	Amended the Proceeds of Crime (Business in the Regulated Sector) Order 2015 to bring businesses involved in virtual currencies under the oversight of the Financial Services Authority (FSA).[55]	Apr-15
Israel	Unregulated	Set up a committee for the examination and regulation of ICOs, which made recommendation for a heavily regulated cryptocurrency issuance platform.[56]	Mar-18
Italy	Unregulated	Published a discussion document about ICOs and crypto-assets exchanges, which may lead to the introduction of a specific regulation.[57]	Mar-19
Jamaica	Unregulated	No regulations on ICO, but looking to facilitate crypto-trading on the Jamaican Stock Exchange.footnotehttps://www.jamstockex.com/jamaica-stock-exchange-and-blockstation-sign-historic-agreement-bringing-regulated-digital-asset-trading-to-investors/	Aug-18
Japan	Unregulated	A study group backed by the government published a report proposing to regulate ICOs, but the recommendations are yet to be implemented.[58]	Dec-18
Kazakhstan	Unregulated	Reports of preparation of legislative amendments prohibiting the purchase and sale of cryptocurrencies, but evidence of enactment of the proposed amendments was not found.[59]	Mar-18
Kenya	Unregulated	No regulation, but issued warnings on virtual currencies.[60]	Dec-15
Kyrgyzstan	Unregulated	No information appears to be available.	-
Laos	Unregulated	Prohibition on financial institutions to transact with virtual currencies.[61]	Oct-18
Latvia	Regulated	ICO projects are required to obtain authorization to make public offering or to provide of investment services.[62]	Nov-17
Liechtenstein	Regulated	Passed a regulation on tokenization, virtual asset service provider and blockchain focusing on investor protection, preventing money laundering and to establish clarity.[63]	Sep-17
Lithuania	Regulated	The national regulatory and legal regime may apply to specific to ICO models.[64]	Oct-17
Luxembourg	Regulated	No specific rules but current laws remain applicable subject to design of the ICO.[65]	Mar-18
Macedonia	Unregulated	No regulation, but issued warnings.[66]	Sep-16
Malaysia	Regulated	ICO issuers are required to comply with relevant regulations relating to payments and currency matters, and are subject to anti-money laundering guidelines.[67]	Dec-18
Malta	Regulated	ICOs are regulated by Virtual Financial Assets Act.[68]	Jul-18
Marshall Islands	Unregulated	Experimenting with blockchain with the aim of future issuance of digital coins.[69]	Feb-18
Mauritius	Regulated	ICOs are subject to the Securities Act 2005 and any regulations issued thereunder, including the requirement for a prospectus.[70]	Apr-19
Mexico	Regulated	Depending on the characteristics of the ICO, the tokens may be deemed as securities, and therefore, their offer to the public is subject to the conditions and limitations.[71]	Dec-17
Monaco	Unregulated	No regulation, but warnings issued to investors.[72]	Nov-18
Netherlands	Regulated	Potential issuers need to properly analyze the extent of any overlap with financial regulation and supervision before launching their ICO.[73]	Dec-18
New Caledonia	Unregulated	No information appears to be available.	-
New Zealand	Regulated	If an ICO provides a financial product or service, all promotional material must comply with the fair dealing provisions.[74]	Oct-17

[54]https://www.centralbank.ie/news/article/financial-regulation-and-technological-change-gerry-cross
[55]https://www.iomfsa.im/media/2365/icoguidanceforapplicants.pdf
[56]http://www.isa.gov.il/sites/ISAEng/1489/1511/Pages/eitinot220318.aspx
[57]https://www.bancaditalia.it/pubblicazioni/qef/2019-0484/QEF_484_19.pdf
[58]https://www.fsa.go.jp/en/news/2019/20190828/Overview_of_the_policy_agenda.pdf
[59]https://sputniknews.com/asia/201803301063085023-kazakhstan-digital-currency-mining-ban/
[60]https://www.centralbank.go.ke/images/docs/media/Public_Notice_on_virtual_currencies_such_as_Bitcoin.pdf
[61]http://www.vientianetimes.org.la/freeContent/FreeConten_Don.php
[62]https://www.fktk.lv/en/media-room/other-publications/fcmc-alerts-investors-about-a-new-financial-investment-service-initial-coin-offering-ico-and-associated-risks/
[63]https://www.fma-li.li/files/fma/fma-factsheet-ico.pdf
[64]https://www.lb.lt/uploads/documents/files/Pozicijos%20del%20virtualiu%20valiutu%20ir%20VV%20zetonu%20platinimo%20EN.pdf
[65]http://www.cssf.lu/fileadmin/files/Protection_consommateurs/Avertissements/W_ICOS_140318_eng.pdf
[66]http://www.nbrm.mk/ns-newsarticle-soopshtieniie_na_nbrm_28_9_2016.nspx
[67]http://www.bnm.gov.my/index.php?ch=en_press&pg=en_press&ac=4783
[68]https://www.mfsa.mt/fintech/vfa-faqs/
[69]https://rmiparliament.org/cms/ library/category/37-2018.html?download=410:p-l-2018-53-declaration-and-issuance-of-the-sovereign-currency-act,-2018
[70]https://www.fscmauritius.org/media/70864/guidance-note-on-securities-tokens.pdf
[71]https://www.gob.mx/cnbv/prensa/comunicado-conjunto-la-shcp-banxico-y-la-cnbv-alertan-al-publico
[72]http://www.ccaf.mc/en/news/event/warning-on-crypto-assets-ico?
[73]https://www.afm.nl/en/professionals/onderwerpen/ico
[74]https://www.fma.govt.nz/compliance/cryptocurrencies/fair-dealing-and-initial-coin-offers/

Nigeria	Unregulated	No regulation, but warnings issued to investors.[75]	Jan-17
Norway	Unregulated	No regulation, but warnings issued to investors.[76]	Nov-17
Pakistan	Unregulated	Introduced prohibition of dealing in virtual currencies/tokens.[77]	Apr-18
Panama	Unregulated	No information appears to be available.	-
Peru	Unregulated	No information appears to be available.	-
Philippines	Unregulated	Recently called for input on the proposed ICO regulation.[78]	Mar-19
Poland	Regulated	ICO projects are required to obtain authorization for making a public offering or provision of investment services.[79]	Nov-17
Portugal	Unregulated	No regulation, but warnings issued to investors.[80]	Nov-17
Romania	Unregulated	No regulation, but warnings issued to investors.[81]	Jan-19
Russia	Unregulated	Ministry of Finances published a draft law on digital financial assets.[82]	Jan-18
Saint Kitts and Nevis	Unregulated	No information appears to be available.	-
Saint Lucia	Unregulated	No information appears to be available.	-
Saint Vincent and The Grenadines	Unregulated	No information appears to be available.	-
Samoa	Unregulated	No information appears to be available.	-
Serbia	Unregulated	No regulation, but warnings issued to investors.[83]	Oct-14
Seychelles	Unregulated	Proposed a draft framework for a FinTech Regulatory Sandbox .[84]	Nov-18
Singapore	Regulated	A guide is provided in relation to the application of securities laws to ICOs. Tokens may be regulated if they are deemed as capital markets product under the Securities and Futures Act.[85]	Nov-17
Slovakia	Unregulated	No regulation, but warnings issued to investors.[86]	Nov-13
Slovenia	Unregulated	No regulation, but warnings issued to investors.[87]	Sep-17
South Africa	Unregulated	A joint working group comprising several regulatory bodies has introduced a consultation paper on crypto assets.[88]	Apr-18
South Korea	Banned	Financial Services Commission (FSC) prohibits all forms of the blockchain funding method regardless of technical terminology.[89]	Sep-17
Spain	Regulated	No specific rules but current laws remain applicable subject to design of the ICO.[90]	Feb-18
Sweden	Unregulated	No regulation, but related warnings issued.[91]	Nov-17
Switzerland	Regulated	Swiss Financial Market Supervisory Authority has published guidelines on the regulatory treatment of ICOs.[92]	Feb-18
Taiwan	Regulated	The tokens issued after ICOs are considered to be securities, and a failure to obtain authorization may lead to a criminal liability.[93]	Jun-18
Tanzania	Unregulated	No information appears to be available	-

[75] https://www.cbn.gov.ng/out/2017/fprd/aml%20january%202017%20circular%20to%20fis%20on%20virtual%20currency.pdf
[76] https://www.finanstilsynet.no/markedsadvarsler/2017/initial-coin-offerings-icoer—advarsel-til-investorer-og-foretak/
[77] http://www.sbp.org.pk/bprd/2018/C3.htm
[78] http://www.sec.gov.ph/wp-content/uploads/2018/12/Notice-and-Proposed-Rules-on-Initial-Coin-Offering.pdf
[79] https://www.knf.gov.pl/knf/en/komponenty/img/The_KNFs_statement_on_selling_socalled_coins_or_tokens_ICO_60238.pdf
[80] http://www.cmvm.pt/en/Comunicados/Comunicados/Pages/20180119.aspx
[81] https://www.bnro.ro/page.aspx?prid=14338
[82] http://www.cbr.ru/eng/press/pr/?file=05092017_160022eng2017-09-05t15_59_51.htm#highlight=initial%7Ccoin%7Coffering
[83] https://www.nbs.rs/internet/latinica/scripts/showContent.html?id=7607&konverzija=yes
[84] https://www.fsaseychelles.sc/fintech-regulatory/
[85] https://www.mas.gov.sg/-/media/MAS/Regulations-and-Financial-Stability/Regulations-Guidance-and-Licensing/Securities-Futures-and-Fund-Management/Regulations-Guidance-and-Licensing/Guidelines/Guide-to-Digital-Tokens-Offering-last-updated-on-5-April-2019.pdf
[86] https://www.nbs.sk/en/press/all-press-releases/press-release/_narodna-banka-slovenska-s-warning-to-the-public-on-bitcoin
[87] https://www.bsi.si/en/media/1138/financial-stability-board-warning
[88] https://www.fsca.co.za/Regulatory%20Frameworks/Documents%20for%20Consultation/CAR%20WG%20-%20Consultation%20paper%20on%20crypto%20assets.pdf#search=initial%20coin%20offering
[89] http://www.fsc.go.kr/info/ntc_news_view.jsp?bbsid=BBS0030&page=1&sch1=&sword=&r_url=&menu=7210100&no=32085
[90] http://www.cnmv.es/Portal/verDoc.axd?t=%7b62395018-40eb-49bb-a71c-4afb5c966374%7d
[91] https://www.fi.se/sv/publicerat/nyheter/2018/olampligt-for-konsumenter-att-investera-i-virtuella-valutor/
[92] https://www.finma.ch/en/news/2018/02/20180216-mm-ico-wegleitung/
[93] https://www.fsc.gov.tw/ch/home.jsp?id=96&parentpath=0&mcustomize=news_view.jsp&dataserno=201806220002&aplistdn=ou=news,ou=multisite,ou=chinese,ou=ap_root,o=fsc,c=tw&dtable=News

Thailand	Regulated	The Thai Government Gazette has published two Royal Decrees, one of which also regulates ICOs, and the other amends the Revenue Code to collect capital gains taxes on cryptocurrencies.[94]	May-18
Turkey	Unregulated	No information appears to be available	-
Ukraine	Unregulated	No specific regulation, and existing Ukrainian legislation does not allow for a security to be issued in the form of a token in a blockchain register.[95]	Nov-17
United Arab Emirates	Unregulated	Securities and Commodities Authority (SCA) does not regulate ICOs, however, under the Regulatory Framework for Stored Values and an Electronic Payment System all transactions in 'virtual currencies' can be deemed to be prohibited.[96]	Jan-17
United Kingdom	Regulated	In a recently issued guidelines it is stated that current laws are applicable subject to design of ICO.[97]	Jul-19
United States	Regulated	No specific rules but current laws remain applicable subject to design of the ICO.[98]	Dec-17
Vanuatu	Unregulated	No information appears to be available	-
Venezuela	Unregulated	Though there is no ICO-specific regulation, a new crypto bill provides legal framework for the cryptocurrency industry.[99]	Jan-19
Vietnam	Unregulated	Relevant companies and funds are directed not to engage in any issuance, transaction or brokerage activities related to cryptocurrencies.[100]	Jul-18
Virgin Islands, British	Unregulated	No information appears to be available	-
Virgin Islands, U.S.	Unregulated	No information appears to be available	-

Note: The table provides information on ICO-related regulations in the 105 jurisdictions that we found to have hosted at least one ICO as of September 2018. The regulatory status of each country is designated to one of three categories: Regulated (ER), Unegulated (LR) and Banned (B) based on the information available on August 2019, as shown in the second column. The third column provides a brief description of the regulatory status, and the fourth column provides the month in which the regulation-related action occurred. In cases where regulations were introduced on or after September 2018, the countries are categorized as unregulated in our analyses.

[94] https://www.bot.or.th/Thai/MonetaryPolicy/ArticleAndResearch/FAQ/FAQ_126.pdf

[95] http://www.fst-ua.info/wp-content/uploads/2019/01/Cryptocurrency_Paper_Sept2018_en.pdf

[96] https://www.centralbank.ae/en/pdf/notices/Regulatory-Framework-For-Stored-Values-And-Electronic-Payment-Systems-En.pdf

[97] https://www.fca.org.uk/news/statements/initial-coin-offerings

[98] https://www.sec.gov/ICO

[99] http://www.minci.gob.ve/wp-content/uploads/2019/01/Gaceta-Oficial-Decreto-Constituyente-sobre-el-Sistema-Integral-de-Criptoactivos.pdf

[100] https://sbv.gov.vn/webcenter/portal/en/home/sbv?_afrLoop=22151117375015577#%40%3F_afrLoop%3D22151117375015577%26centerWidth%3D80%2525%26leftWidth%3D10%2525%26rightWidth%3D10%
state%3Dpca5h5tl_4