Ban, Boom, and Echo!
Entrepreneurship and Initial Coin Offerings

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Forthcoming in Entrepreneurship Theory and Practice

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ABSTRACT

Regulatory spillovers occur when regulation in one country affects either the expected regulatory approach and/or entrepreneurial finance markets in other countries. Drawing on institutional theory, we investigate the global implications of a regulatory spillover on entrepreneurship. We argue that regulatory spillovers have both short- and long-term effects on the number and quality of entrepreneurial finance initiatives such as Initial Coin Offerings (ICOs). Based on a large-scale sample of ICOs in 108 countries, we find that a regulatory ban of ICOs in one country causes a short-term increase in the number of low-rated ICOs in other countries and a long-term drop in the number of ICOs, especially low-rated, which increases the average ICO rating. That is, a restrictive regulation triggered a process of increased market selection.

INTRODUCTION

The traditional context in which the intersection of entrepreneurship and institutional theory is examined involves formally defined goods, products, and processes that have boundaries that are shaped by country institutions. For example, national laws have been shown to shape entrepreneurship and venture capital (Da Gbadji et al., 2015). In the evolving modern economy, however, many products are designed to mitigate the influence of country regulatory institutions. In some cases, products are even designed to operate globally and decentralized (Hsieh et al., 2018). The most notable example of such a product is an Initial Coin Offering (ICO). With the development of innovative entrepreneurial financing practices such as ICOs, an important question in entrepreneurship theory and practice arises as to whether country regulatory institutions still matter in this context, and if so, how?

In an ICO, "new ventures raise capital by selling tokens to a crowd of investors. Often, this token is a cryptocurrency, a digital medium of value exchange based on the distributed ledger technology" (Fisch, 2019: 1). With the first ICO (i.e., Mastercoin) occurring in July 2013, ICOs represent a recent entrepreneurial finance practice. Moreover, ICOs represent a global phenomenon, but they are adopted unevenly across countries (Huang et al., 2019). The development of the ICO market has been very volatile, with some 7 billion USD raised in 2017, 19.7 billion in 2018 and 4.1 billion from January to October 2019.[1] Governments around the world have been trying to decide on how to react to the emerging ICO market and the opportunities and threats involved. This context provides a "laboratory" to increase our understanding of how

[1] While these statistics indicate a significant decline of the ICO market in 2019 (10 months), at 4.1bn this still represents a non-trivial market, equivalent to about half of the European and UK venture capital market (Invest Europe, 2019). For more details, see:
https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf

changes in country regulatory institutions influence the development of innovative entrepreneurial finance markets, which is a fundamental question in entrepreneurship.

In this paper, we tackle this topic by asking the following question: *How does a regulatory ban in specific countries (i.e., the China/South Korea ICO ban) influence the number and quality of ICOs in other countries over time*? The common perspective taken, in extant entrepreneurship literature that draws on institutional theory, is that through coercive pressures (i.e., regulations and enforcement) governments can affect the depth and breadth of their own countries' entrepreneurial finance markets and entrepreneurship quantity and quality. In this paper, we depart from this focus and present an institutional theory of regulatory spillovers that explains how changing regulatory institutions, in a specific set of countries, may influence new entrepreneurial finance markets in *other* countries.

In our multivariate regressions, we use quarterly data on the number of ICOs and ICO quality ratings for up to 108 countries from Q3 2015 to Q3 2019. We find that the China/South Korea ICO ban initially made entrepreneurs rush to the ICO market in other countries. This rush was especially driven by lower-rated ICO projects. We do not find evidence that this rush had an immediate impact on the ICO volume fundraised, suggesting that ICO investors did not chase the increased offerings. After this initial rush, the ICO market cooled down, with a decreasing long-term trend in the number of ICOs and volumes raised. Interestingly, after the China/South Korea ICO ban, in the longer term, the number of low-rated ICOs declined significantly, while the number of high-rated ICOs remained remarkably robust in a generally declining market. Accordingly, the average ICO rating increased over time. Taken together, the China/South Korea ban caused an initial low-quality rush to the ICO market from other countries, but eventually cleaned up the market.

Our study contributes to the literature in several ways. First, understanding the emergence of innovative sources of entrepreneurial finance, such as ICOs, is a premier topic in entrepreneurial finance (Chen and Bellavitis, 2020; Block et al., 2018; Fisch, 2019; Fisch et al., 2019). We contribute to a growing academic literature on ICOs. Several studies have focused on the success factors that foster ICO fundraising (Adhami, Giudici and Martinazzi, 2018; Fisch, 2019; Momtaz, 2020). Studies have also started to examine the motivations to invest in ICOs (Fisch et al., 2019), investor behavior in ICOs (Boreiko and Risteski, 2020), and the motivations of entrepreneurs to resort to ICOs (Schückes and Gutmann, 2020). Others have investigated market cycles and the link between ICOs, Bitcoin, and Ethereum (Masiak et al., 2019) and the link between ICOs and venture capital (Fisch and Momtaz, 2019). Probably the closest related to our work is the paper by Huang et al. (2019), who examine the geography of ICOs (i.e., a static snapshot of ICOs in different countries), but our focus is on the evolution of ICOs over time; thereby, we provide a more dynamic picture. Moreover, Huang et al. (2019) show the importance of factor markets (e.g., the development of venture capital and crowdfunding markets) on the geography of ICOs, while our focus is on the impact of changing regulatory institutions (the "formal rules of the game"; Williamson, 2000: 597) in specific countries on the global ICO market.

Second, more broadly, we contribute to a limited, but growing, stream of research that connects entrepreneurship with institutional theory (Bruton et al., 2010; Tolbert, David, and Sine, 2011). Extant entrepreneurship research has studied how country institutions influence the founding of new ventures and entrepreneurial growth opportunities in those countries (e.g., Armour and Cumming, 2008; Estrin et al., 2013; Stenholm et al., 2013), or how country institutions relate to the development of entrepreneurial finance markets, including the size of venture capital markets and venture capitalists' behavior in countries (e.g., Bruton et al., 2005; Groh et al., 2010; Li and Zahra, 2012). Still, we lack a deep theoretical and empirical understanding of how *changes* in

country regulatory institutions can influence the development of new entrepreneurial finance markets in *other* countries, a topic we address in this paper.

This topic is important because the ICO context presents unique challenges to institutional theory, which commonly takes regulatory institutions as linked to specific countries (Holmes et al., 2013). While many ICOs have clear links to specific countries, ICOs can operate globally and in a decentralized fashion (Adhami et al., 2018). Accordingly, the impact of country regulatory institutions on the adoption of this new entrepreneurial finance practice is often assumed to be limited. Indeed, in the context of ICOs, entrepreneurs could technically get around specific country regulations by operating globally and decentralized, and could easily relocate to a more friendly regulatory environment. As one commentator suggested: "[T]he blockchain or digital currency has a very typical global character, resulting in a simple prohibition [in a specific country] having no effect in the physical space".[2] The new theory and evidence presented in this paper, however, suggests that the exact opposite is true. Changes in country regulatory institutions play a very pronounced role in entrepreneurial processes and the adoption of innovative entrepreneurial finance practices in other countries. We present new insights into how specific governments can strongly influence the development of new entrepreneurial finance markets in other countries, through mechanisms other than coercion. Specifically, regulatory spillover effects entail unique short-term and long-term effects, and impact not only the quantity but also the quality of ICOs in other countries.

Taken together, our study extends and bounds what we know about the connections between institutions and entrepreneurship and spillovers from one country to another, as recognized in other work (for a recent review, see Cumming et al., 2017). Our study has important

[2] Source: https://bravenewcoin.com/insights/china-ico-ban-proving-ineffective

implications for policy-design, and calls for policy integration across the world when approaching new entrepreneurial finance markets, such as the ICO market.

THEORY AND HYPOTHESES

In this section, we first discuss the institutional theory of regulatory spillovers. Thereafter, we introduce the context of ICOs and specific actors (entrepreneurs, investors, and regulators) in that market. After explaining the theory and context, we develop our hypotheses.

Regulatory Spillovers

Institutional theory is not a unified theory. While some scholars rely on the tools of economic theory, others prefer to take a sociological approach (Bruton et al., 2010). Despite these different perspectives, there is broad agreement that institutions, including formal regulations, matter and heavily influence people's actions (Williamson, 2000). The general perspective is that national governments are powerful actors, who significantly influence the diffusion of practices in their countries, generally through coercive pressures (DiMaggio and Powell, 1983; Scott, 2001). In other words, their rule-setting, monitoring, and sanctioning activities may foster or hamper the diffusion of practices (Scott, 2003).

Extant entrepreneurship research inspired by institutional theory (Bruton et al., 2010; Scott, 2001; Williamson, 2000) has focused on how regulation within a country influences the breadth and depth of entrepreneurial finance markets in those countries (e.g., Groh et al., 2010; Li and Zahra, 2012) or, more broadly, how regulation in countries influences the quantity and quality of entrepreneurial finance markets in those countries (e.g., Armour and Cumming, 2008; Estrin et al., 2013; Stenholm et al., 2013). In this paper, we draw on institutional theory, to examine how regulatory actions in specific countries influence a new segment of the entrepreneurial finance market (i.e., the ICO market) in other countries.

Regulatory spillovers can apply in one of two cases (Goldsmith, 2000). First, a regulatory change in one country can inspire a similar regulatory change in another country, or at least a change in the actual or *expected* regulatory approach in another country. For example, in 2006 in the United Kingdom, there was a ban on "trailer fees" in the sale of mutual funds. A trailer fee is a fee paid from the fund to an advisor at the end of each year as a percentage of the amount of capital that an investor has invested with the fund, thereby creating a conflict of interest between the advisor and investor. These fees were subsequently banned in Continental Europe in 2007, and in Australia in 2010; and over the period 2012-2018 these fees were investigated for a potential ban in Canada, as inspired by the bans in other countries (Cumming et al., 2020a). A regulatory spillover does not require an exact same type of regulatory change from one country to another country. That is to say that just because there was no regulatory ban on mutual fund fees in Canada, it does not mean that Canada was immune to regulatory spillover in that context. All that is needed is for a change in approach to regulation, and/or change in surveillance and enforcement of related regulations or regulatory oversight for there to be a regulatory spillover.

Second, a regulatory spillover can occur when a regulatory change in one country affects the actions of marketplace participants in another country (Goldsmith, 2000). For example, with the mutual fund fee ban in a foreign country, it is possible that advisors will act differently in their home countries in response. There can be a variety of different reasons for the response, possibly due to cross-border activities, and possibly due to future expected regulatory oversight or changes.

In sum, regulatory spillovers can affect marketplaces through two possible channels. Below, we consider the context of ICOs to examine the possible implications of both channels. We describe the entrepreneurs in this marketplace and their investors and explain our findings in detail.

The ICO Players: Entrepreneurs, Investors, and Regulators

ICO Entrepreneurs

ICO quality may vary broadly. Higher quality ICOs are launched by a team of experienced and motivated entrepreneurs who have a clear and useful product, and a viable long-term vision and business model to ensure financial stability and success. High-quality ICOs have timely and full disclosure to ensure investor confidence. Setting up a high-quality ICO takes resources and time to develop the technology and infrastructure.[3]

On the other end of the spectrum, a low-quality ICO is launched with limited investments in terms of resources and time. The team behind the ICO is usually of lower quality, encompassing entrepreneurs with poor experience and limited technical skills. This combination leads to minimal investment in technology to mitigate risks of hacks and fraud. The ICO white paper is usually incomplete, and with vague disclosure, promoting a business plan that is not well thought out in a way that would secure the stability of the ICO.

The extreme cases of low-quality ICOs include fraud and the funding of illegal activity. For example, the *Nitro Platform Token* ICO, launched from Malta, is an ICO with low quality ratings. The ICO received a rating of 1/5 on www.icobench.com.[4] At the time of writing, the ICO website showed a team of six but no information on their experience was disclosed. An online search did not find results associated with the team members' names and the ICO name, nor do the team members appear to have LinkedIn profiles. The product is of a dubious nature. The white paper argues that the company intends "to build a business ecosystem that embraces all investors […]. Easier than Tetris. You just want to decide when you want to make money. That's all." The expert reviewer highlights these weaknesses reporting that "this is a scam", "there is a lack of product" and "fake team". One recent paper suggests that 76 billion USD (46 %) of detected illegal activity

[3] Examples of higher quality ICOs are numerous. Some webpages even provide top 10 lists; see for example https://topicolist.com/

[4] Source: https://icobench.com/ico/nitro-platform-token

is financed through cryptocurrencies (Folley et al., 2019). Hornuf et al. (2019) examined a sample of 1,393 ICOs that took place worldwide from September 2016 to July 2018. They identified 274 fraud cases (or about 20% of the sample), including 188 suspected and 175 confirmed fraud cases. Overall, while fraud cases are non-negligible, as detailed above, low-rated ICOs also include genuine entrepreneurial endeavors.

ICO Investors

Most ICO investors are uninformed or unsophisticated. Typical investors are mere speculators that do not do any fundamental research, invest very small amounts, and flip their investment even before the underlying product is developed (Fahlenbrach and Frattaroli, 2019). Fisch et al. (2019) show that next to financial motives, ICO investors may also have technological and ideological motives. They further show that some 39% of ICO investors in their sample have a professional background in technology. Conversely, the majority of their respondents lacks either a professional technology or finance background. Despite the lack of investor sophistication, investors largely lack protection in ICO markets (Cumming et al., 2019; Fahlenbrach and Frattaroli, 2019), as discussed further in the next subsection.

ICO Regulators

In the context of ICOs, it is possible to bypass country regulations and prospectus requirements that would normally apply to firms that seek to sell securities to the broad public (e.g., Adhami et al., 2018). During the period between 2015 and 2019, ICO regulation is at its very infancy. Currently, in different countries around the world, even in the U.S., there are ongoing debates as to whether or not ICOs are a "security" in a way that their regulation and surveillance would fall within the jurisdiction of a securities commission (Cumming et al., 2019). As such, there is much regulatory uncertainty surrounding ICOs. Given the international links associated with

ICOs, and the fact that ICOs face scant securities regulation oversight, regulators often look towards their counterparts in other countries for regulatory solutions (Clements, 2019a, 2019b).

In the early days of ICOs, some commentators suggested that the ICO market is "a little like the Wild West … - anything goes".[5] Unsurprisingly, governments across the world were concerned about the risks involved. Accordingly, as the ICO market grew exponentially, governments jumped on the bandwagon to take steps in informing the public of the risks involved, providing more guidance, and/or regulating ICOs. For instance, the Monetary Authority of Singapore highlighted that "ICOs are vulnerable to money laundering and terrorist financing risks".

Regulation of crypto markets invariably faces problems that need to be solved. Bancor's ICO, for example, raised in excess of 153 million USD in a mere three hours (Suberg, 2017). Bancor offers a crypto exchange platform and is designed to avoid any mediators. Regulatory responses, if needed or if implemented, come months if not years later after long processes of research and consultation in the case of crypto regulation (Cumming et al., 2019) and most other forms of securities' regulation (Rodrigues, 2017).

Summary of ICO Market and Key Players

The ICO market is highly interconnected around the world. ICOs raise funding for global and borderless products, running on the back of a digital blockchain. The ICO market is characterized by both high- and low-quality ICOs. Entrepreneurs can act very quickly to raise millions of dollars in a short period of time with unsophisticated investors, and with a possibly delayed regulatory response diverging from one country to another. The characteristics of ICO players and the interconnectedness of the ICO market suggest possible regulatory spillovers with associated short- and long-term implications.

[5] Source : https://www.bbc.com/news/business-41157249

Entrepreneurial Implications of ICO Regulatory Spillovers

The most notable regulatory event affecting ICOs around the world during the period of our study happened in September 2017, when the Chinese and South Korean governments announced that ICOs were illegal in their countries. The South Korean Financial Services Commission's (FSC) vice-chairman of financial affairs expressed "a serious concern that the recent inflow of funds into the nonproductive speculative direction is showing up".[6] The FSC has further suggested that ICOs are overly speculative and constitute a "violation of the capital market law".[7] A committee led by China's Central Bank "voiced concern that some ICOs are financial scams and pyramid schemes".[8]

Based on the institutional setting of ICOs and regulatory spillovers, we conjecture that there will be differential short- and long-term spillover effects of the China/South Korea ICO ban on the number and quality of ICO offerings in other countries.

Short-Term Spillover Hypotheses

As governments were trying to decide on how to react to the growing ICO market and the opportunities and threats involved, the China/South Korea ICO ban aggravated the regulatory uncertainty in other countries. More specifically, entrepreneurs may anticipate that other countries will follow with a ban or, at a minimum, that tighter regulations might be implemented. One commentator stated at the time of the China/South Korea ban: "Governments around the world and at every level struggle to make sense of what blockchain technology means for their constituents. Perhaps these governing bodies will take the Chinese route and outright ban ICOs, and perhaps

[6] Source: https://www.nasdaq.com/article/south-koreas-ico-ban-a-reaction-to-serious-concerns-over-cryptocurrency-investment-practices-cm854236

[7] Source: https://www.coindesk.com/south-korean-regulator-issues-ico-ban/

[8] Especially with the China ICO ban, commentators were unclear about the actual motivation behind the ban, stating: "I don't know if the shutdown was motivated by a concern for the investors, or if they just want to control the market". As we detail below, the unclear motivation is not fundamentally affecting the logic related to our hypotheses.

they will take a more moderate approach and attempt to regulate them".[9] There was a general sentiment that after the China/South Korea ban "most countries will finally make up their minds about ICO's and will either ban them or provide a regulatory framework addressing the various aspects of their operation".[10]

We propose that the increased global regulatory uncertainty caused by the China/South Korea ICO ban will make entrepreneurs—especially those with existing ICO plans or those that were already in the process of developing ICO plans—more likely to rush to the ICO market. While common wisdom suggests that regulatory uncertainty makes people delay their actions, an increasing body of research has challenged this view. More specifically, managers can cope with regulatory uncertainty in multiple ways besides delaying their actions (Marcus et al., 2011). Indeed, Aragón-Correa and Sharma (2003) suggest that environmental uncertainty makes firms more likely to act "proactively" and take actions to minimize its effects. Hoffmann et al. (2009) illustrate that one of the primary motivations why managers do not postpone their actions, despite regulatory uncertainty, is to secure competitive resources and benefit from current (favorable) regulation (or lack of regulation). For many blockchain-based firms, it will be difficult (or they may be unwilling) to mobilize financial resources from alternative sources of funding such as traditional banks or venture capital investors (e.g., Schückes and Gutmann, 2020). Consequently, in the period immediately after the China/South Korea ICO ban, there were significant pressures for entrepreneurs that were already in the process of planning an ICO to rush to the ICO market to avoid potential future regulatory hurdles in countries other than China and South Korea.

[9] Source: https://bankinnovation.net/allposts/operations/comp-reg/regulations-controls-and-non-security-tokens-the-chinese-ico-ban-in-context/

[10] Source: https://medium.com/geneos/ico-regulations-around-the-world-current-status-and-forecasts-for-2018-5827712936bb

In addition, governments were not only regulating the market, but they were also warning investors of the risks involved in ICOs. As previously mentioned, China's Central Bank warned that ICOs could be "scams" and "pyramid schemes". China was not alone in warning investors. Therefore, entrepreneurs' expectations of a possible decrease in the number of ICO investors, ICO investor interest, or additional scrutiny by ICO investors directly after the China/South Korea ICO ban may push entrepreneurs to rush to the ICO market to capture the available ICO funding before it potentially decreases. This leads us to the following hypothesis:

> ***Hypothesis 1:*** *The China/South Korea ban will increase the number of ICOs in other countries in the quarter after the ban.*

This expected rush to the ICO market by entrepreneurs after the China/South Korea ICO ban—because of regulatory uncertainty, the possibility of stricter regulations in the (near) future, and a potentially weaker investors' interest—can have at least two additional effects, both of which lower the quality of ICOs that enter the market. First, as entrepreneurs prematurely rush to the ICO market, this situation may limit the time they allocate to planning, including the development of their team, product, and vision. However, planning is crucial in an entrepreneurial context. Delmar and Shane (2003), for instance, find that planning reduces the probability of venture disbanding, and that it accelerates product development and venture organizing activities. Accordingly, a rush to the ICO market as a reaction to uncertainty post-China/South Korea ICO ban period could harm the overall quality of projects that enter the ICO market.

Second, entrepreneurs with low-quality ICOs (and outright fraudsters) have particularly high incentives to rush to the market in a context where regulatory uncertainty is high and where investors' interest is lower after the China/South Korea ICO ban. One reason for this expectation is that regulatory tightening would increase the cost of conducting an ICO. Consistent with the seminal work of Spence (1973) on signaling and the creation of a separating equilibrium between

high-quality and low-quality people (see also Fisch, 2019 for evidence from the ICO context), low-quality entrepreneurs might be unable to bear the greater costs with the ICO process as regulations become stricter. Further, in a market with lower investors' interest, lower quality ICOs will be the first to be affected, failing to raise the necessary funding. Additionally, research from the crowdfunding context, for instance, shows that fraudsters are particularly sensitive to growing costs both in terms of time and money: as costs increase the utility from committing fraud decreases (Cumming et al., 2020b). Accordingly, entrepreneurs conducting low-quality ICOs (including potential frauds) may have strong incentives to rush to the ICO market before any anticipated regulatory tightening and lower investors' appetite following the China/South Korea ICO ban. This leads us to hypothesize the following:

> ***Hypothesis 2:*** *The China/South Korea ban will decrease the quality of ICOs in other countries in the quarter after the ban.*

Long-Term Spillover Hypotheses

As we argued before, the regulatory uncertainty following the China/South Korea ban is expected to initiate a rush in ICOs related to entrepreneurs with existing ICO plans or those that were already in the process of developing ICO plans. Moreover, this rush will especially relate to lower-rated ICOs. However, once this initial rush is over, entrepreneurs that originally did not have existing ICO plans, or those that were not in the process of developing ICO plans, are expected to exhibit a different behavior. In the long-term, regulatory uncertainty may become particularly negative because the expectation of a ban (or potentially stricter regulation) in the future may decrease the likelihood that new entrepreneurs consider investing time and resources in starting an ICO process (e.g., Marcus et al., 2011).

Moreover, the institutional legitimacy of a practice is particularly crucial for its adoption in the longer-term (e.g., DiMaggio and Powell, 1983; Guler et al., 2002). The China/South Korea ICO

ban is expected to hamper the institutional legitimacy of ICOs or the belief that ICOs represent proper entrepreneurial finance practices. Even when governments do not provide a motivation behind their regulatory review, their actions provide indirect information to market participants. As highlighted above, governments in China and South Korea provided direct information on the motivation of a ban, stressing the risks and problems associated with ICOs. Therefore, after the China/South Korea ban, the institutional legitimacy of ICOs in other countries might decrease and market participants might perceive ICOs to be less appropriate entrepreneurial finance practices. Consequently, new entrepreneurs become less likely to consider the ICO market an appropriate avenue to raise funds, making them less likely to consider launching an ICO; and, at the same time, ICO investors become increasingly less likely to contribute funds.

Building on the notion that there are regulatory spillovers across jurisdictions, the China/South Korea ICO ban could limit the legitimacy of ICOs across borders (DiMaggio and Powell, 1983; Scott, 2001, 2003). For instance, Kucik and Pelc (2016: 713) showed that rulings related to human rights may have "the power to modify global norms" and an "ability to change actors' expectations as to what constitutes acceptable behavior" even in countries that are not subject to the ruling. Consequently, as institutional legitimacy is crucial for the long-term adoption of new practices, the expected reduced institutional legitimacy of ICOs after the China/South Korea ban will prevent new entrepreneurs and investors from entering the ICO market. These effects might lead to a reinforcing cycle where both entrepreneurs and ICO investors become increasingly less likely to enter the ICO market. Accordingly, the number of ICOs gradually declines due to decreasing demand and supply. Thus:

> ***Hypothesis 3:*** *After the China/South Korea ban, the long-term trend in the number of ICOs in other countries will decrease.*

The increased difficulty to raise financing through ICOs and the cooling of the ICO market (due to the decreasing demand and supply discussed above) after the China/South Korea ICO ban may also bring an important quality advantage. An ICO professional highlighted that the China ICO ban could be "clearing the way for responsible token issuers".[11] We argue that after the China/South Korea ICO ban, there will be an upward trend in the average quality of ICOs for several reasons.

First, the cooling of the market makes it less attractive for entrepreneurs with low-quality (and potentially for fraudulent) ICOs. Indeed, as the efforts required to successfully raise funding increase due regulatory restrictions, it becomes economically less feasible for low quality ICOs to enter the market (e.g., Cumming et al., 2020b). Conversely, a cooling market might push entrepreneurs to increase the quality of their ICO projects to compete for the lower availability of ICO funding in the market.

Second, despite the problems in the ICO market, some entrepreneurs and investors have ideological motivations to start ICOs or back ICOs, respectively (e.g., Fisch et al., 2019; Schückes and Gutmann, 2020). For instance, some entrepreneurs engage in ICOs to circumvent so-called undemocratic traditional investors, such as venture capitalists (Schückes and Gutmann, 2020). Fisch et al. (2019) argue that "while some investors appear insensitive to ideological motives… others care passionately about them". These individuals, who care deeply about the ICO market, are expected to have strong self-regulating incentives to restore (or increase) the institutional legitimacy of ICOs after the ban. Entrepreneurs could do so by adopting global best practices, and investors (and the ICO community more broadly) could do so by increasing efforts to expose low-quality projects (and scams). The fact that the ICO market is characterized by global ties further

[11] Source: https://bankinnovation.net/allposts/operations/comp-reg/regulations-controls-and-non-security-tokens-the-chinese-ico-ban-in-context/

increases self-regulation pressures for entrepreneurs in low-regulation countries who are pushed to adopt strict standards (e.g., Christmann and Taylor, 2001).

Taken together, the number of low-quality ICOs is expected to decrease after the China/South Korea ICO ban. Still, there remains a community with ideological motives that will push for high-quality ICOs. Accordingly, the average quality of ICOs is expected to gradually increase after the China/South Korea ICO ban. This leads to our final hypothesis:

Hypothesis 4: *After the China/South Korea ban, the long-term trend in the quality of ICOs in other countries will increase.*

DATA AND VARIABLES

Sample

We test our hypotheses using a comprehensive sample of all ICOs worldwide from Q3 2015 to Q3 2019. Prior to the beginning of our dataset, we could identify only four ICOs. Hence, we are able to cover the vast majority of ICOs happening from the early stages of the industry. We collect the ICO data from www.icobench.com. This website is regarded as one of the most representative sources of ICO data and has been used by prior researchers (e.g., Adhami and Guegan, 2019). Icobench provides data such as the location of the ICO, founders' names, expert quality ratings, and amount fundraised. We collected data on 5,609 ICOs[12] launched in 134 countries. As previously mentioned, our unit of analysis is the country-quarter-year. Thus, we coded ICO activity by country and quarter-year. By doing so, we obtained a sample of ICO activity for 17 quarters and 134 countries, from Afghanistan to Zimbabwe, resulting in 2,278 country-quarter-year

[12] We cannot use all ICOs due to missing variables. We lose observation at the ICO level due to lack of location (120 ICOs that can be considered "global"), ICO launch date (1,630 ICOs), or fundraising amount (2,218 ICOs). Our country-quarter final sample is based on 3,838 ICOs.

observations.[13] We remove observations from China and South Korea to avoid confounding effects since the ban was issued in those countries, and we also remove observations where ICOs cannot be attributed to any particular location. Some of these "location-less" ICOs can be considered missing data but, as reported in other studies (e.g., Adhami et al., 2018), some ICOs are truly global and are not attached to any particular country. In any case, these "location-less" ICOs are not included in our study. We further complemented ICO data with data collected from a number of additional sources, as described in more detail below.

Variables

In order to avoid reverse causality arguments, we use the one-period forward measure of our dependent variable. With this method, all our independent variables and controls predict the next period (quarter) ICOs, easing concerns of reverse causality.

Dependent variables

For this study, we use four different dependent variables. First, we measure the number of ICOs (*No. of ICOs*) in each country by counting the number of ICOs launched in each quarter-year in each country. To construct our second dependent variable, we use the average *ICO rating* obtained by the ICOs launched in a particularly country-quarter as dependent variable. The possible rating ranges from 1 to 5. As of the end of 2019, Icobench.com had more than 300 experts who provided more than 17,000 ICO ratings (most ICOs receive multiple ratings that are then averaged). As reported by the website "*An ICObench expert is an active member of ICObench community that has the right to rate ICOs and conforms to the rules of the experts community. Each expert is assigned a number of points, what represents their distribution weight.*" Accordingly, more

[13] Our models usually have fewer observations due to missing variables for smaller countries. At the country level, some countries are too small and do not have IMF data, or other statistics, and hence are dropped out of our sample. Our models, depending on the dependent variables range from 1,615 (108 countries) to 504 observations (92 countries).

prominent experts have a stronger influence on ratings. Each ICO receives four individual ratings (Benchy, Team, Vision, Product) and an average weighted rating that we use for our analyses.[14] We further exploit this data with our third and fourth dependent variable. We count the number of ICOs launched in each country-quarter whose ratings are in the top and bottom ten percent, respectively. ICOs in the top ten percent have a rating equal to or above 4/5, and the bottom ten percent have a rating equal to or below 2/5. These are considered high-quality and low-quality ICOs, respectively. In our robustness test, we also use different cut-offs.

Figure 1 shows the average rating, as well as the number of high-quality and low-quality ICOs launched over time. It can be noted that the average ICO rating ranged between 2.5 and 2.7 before the China/South Korea ban then increased to 3.3 in Q3 2019. The number of high-quality and low-quality ICOs increased to similar numbers up to 2018, but then the number of low-quality ICOs declined much faster compared to the high-quality ICOs.

---- Insert Figure 1 about here ----

Independent variables

Within our time period, two countries have banned ICOs from their jurisdiction. In particular, in Q3 2017 China has banned all firms and individuals from raising funds through ICO activities, reiterating that ICOs are considered illegal activity in the country. Several entities including the People's Bank of China, the China Securities Regulatory Commission, and the China Insurance Regulatory Commission, issued a joint statement announcing the ban. Similarly, during the same quarter, South Korea banned all ICO activities. The Korean Financial Services Commission declared all kinds of ICOs to be banned as trading of virtual currencies and argued that virtual currencies needed to be tightly controlled and monitored.

[14] More details on how Icobench.com assigns an average rating can be accessed from https://icobench.com/ratings. Last accessed in January 2020.

The *China/South Korea ban* variable takes the value of 0 before Q3 2017, and then 1 from Q3 2017 to Q3 2019 (end of our data). Since we are interested in understanding what the effect of the ban is on the ICO market in *other countries* where there is no ban, the value is the same for every country in the dataset. From the main analyses, we remove the observations from China and South Korea to avoid confounding effects (i.e., a ban will obviously affect the China and South Korea market). Some countries communicated that cryptocurrencies are not a legal tender but, for the purpose of this study, they are not considered ICO bans since some businesses might still accept cryptocurrency payments by their own choice and ICOs are still permitted.

To understand the pre-ban and post ban trends, we include two variables (*Pre ban slope* and *Post ban slope*). In doing so, we follow the methodology outlined by Lagarde (2012). The *Pre ban slope* is a variable that counts the number of quarters starting from 1 at the beginning of our data and then increasing for each quarter up to 8 in Q2 2017 (quarter prior to the China / South Korea ICO ban) and then continuing with the same value (8) till the end of our data in Q3 2019. The *Post ban slope* counts the number of quarters from the China/South Korea ICO ban starting with 1 in Q3 2017 and then increases for each quarter up to 5 in Q3 2019.

Taken together, this empirical strategy allows us to see how our variables of interests were changing before the ban (with the *Pre ban slope*, which controls for any pre-ban trend in the data), how much they have changed immediately after the ban (with the *China/South Korea ban* dummy relating to our Hypotheses 1 and 2), and how much they have changed over the longer-term after the ban (with the *Post ban slope* relating to our Hypotheses 3 and 4).

Controls

As highlighted above, the *Pre ban slope* controls for any trend in the data before the China/South Korea ban. However, several other factors may affect the ICO industry, which we include as controls.

We control for the *domestic market capitalization*. We collected the total market capitalization (in millions of USD) of all stock exchanges in the focal country from the World Federation of Exchanges. When a country has more than one exchange (e.g., U.S.), we summed up the respective market capitalizations of each exchange (e.g., NYSE and NASDAQ). We averaged the daily value for each quarter and subsequently took the natural logarithm.

We also control for (the natural logarithm of) the *Bitcoin price*. It is well known that virtual currencies are surrounded by speculation, and the price of Bitcoin is a good indicator of the popularity of virtual currencies. We use the average for the quarter, and we obtain our data from Coindesk, a reputable news provider about ICOs and virtual currencies' prices.

We capture public interest in ICOs by controlling for *Google trend. Google trend* reports the level of Google searches for the term "Initial Coin Offering" as reported by Google Trends. We translated "Initial Coin Offering" into the native language of each country and then included that in *Google Trend*. We averaged daily searches to get quarterly data in each country. This measure can range from 0-100, and is relative to the top of the period of interest as well as the U.S. which we use as a country of reference.

To control for a country's wealth, we include various International Monetary Fund (IMF) statistics such as the (natural logarithm of) *GDP per capita* in USD, *GDP growth* (winsorized to remove outliers), and *Inflation* which measure the annual changes in consumer prices (winsorized). Considering that ICOs are an Internet phenomenon, *Internet penetration* represents the total Internet users as a percentage of the total population in a country. Data were collected from the International Telecommunication Union (ITU) website for the years 2015-2017. Since ITU does not report 2018-2019 data, we complemented this with data from internetworldstats.com.[15]

[15] In a few cases where we encountered a missing data, we have averaged the previous year and following year's data point.

We control for media attention with four different measures. To start, we collected *Google News*. We searched on *Google News* for the term "Initial Coin Offering" translated into the local language of each country using Google Translate. Considering that Google reports different news depending on the user's location, we have run the same search changing our search location and quarter. From this, we collected the number of results available in each country-quarter. We use the natural logarithm of this measure to capture the amount of news related to ICOs in each country.

We then downloaded all the available news with a limit of 300 per search (i.e., country-quarter) imposed by Google. This provided a total of 179,983 pieces of news. We then used Amazon Web Services language detection to detect the language in which each news item was written and we then analyzed the title and the summary of each news item using a natural language processing (NLP) algorithm targeted to that particular language. NLP is a more advanced tool compared to other methods such as Lexicon, which only counts the number of certain keywords. In fact, NLP tries to understand the sentence construction and actual meaning, providing more accuracy. The final analysis assigns a value of positive, negative, mixed or neutral sentiment. To create the variable *Google News sentiment,* we calculated the percentage of articles in each country-quarter that are positive and negative and then subtracted them to obtain a positive net sentiment (positive – negative).

We then collected all Twitter channels for all ICOs launched. Twitter addresses are provided by icobench.com. After cleaning the data for erroneous or duplicate addresses, we downloaded all tweets and replies associated with each account. We obtained a total of 627,470 original tweets and 866,150 replies. We use the natural logarithm of the sum of these two numbers

to account for *Twitter activity* in each quarter and country associated with the ICO channel. We then analyzed *Twitter sentiment* following the same procedure outlined for *Google News.*[16]

We further hand-collected the monetary value stolen or hacked from cryptocurrency exchanges. For example, a famous hack happened in Japan in the first quarter of 2014 when 480 million USD were stolen from the exchange Mt Gox.[17] We used the coins' value at the time of the hack. We summed the value of all hacks happening in each quarter all around the world (in unreported analyses we used the hacks in each particular country-quarter and results are consistent) to create *Hacks in any country value* (natural logarithm). We collected this data from various sources including, but not limited to, bitcoin.com, bitcointalk.org, coindesk.com. To ensure validity we made sure that our data was confirmed by at least two sources.

Finally, we control for the quality of minority investors' protection reported in the *Ease of Doing Business* ranking collected each year by the World Bank. Table 1 summarizes our variables and sources.

---- Insert Table 1 about here ----

Estimation Method

Three of our dependent variables are count measures (i.e. *no. of ICOs* and *no. of Low/High Rating ICOs*). For these dependent variables, reported in Tables 3 and 5, we run negative binomial regression models with country fixed effects (*xtnbreg*). For the other dependent variable, namely *ICO rating* (Table 4), considering that it is a continuous variable, we run a panel linear regression with country fixed effects. In both cases, country fixed effects allow us to account for unobserved

[16] We also tried to control for Reddit sentiment but, unfortunately, Reddit does not report a precise timing for each post, so it is impossible to assign it to a particular quarter (when only years are available). In unreported analyses, we find that Reddit and Twitter activity and sentiment follow a similar pattern in terms of yearly distribution. We also attempted to download Telegram chats but these are encrypted and impossible to download.

[17] For more details: https://www.bloomberg.com/news/articles/2014-02-28/mt-gox-exchange-files-for-bankruptcy

heterogeneity at the country level. As previously mentioned, in order to avoid reverse causality arguments, we use the one-period forward measure of our dependent variable. This empirical strategy is also useful to attenuate endogeneity issues.

RESULTS

Table 2 reports descriptive statistics and pairwise correlations for our sample. The number of ICOs in each country-quarter ranges from 0 to a maximum of 101 (in the U.S. in Q4 2017). The average quarterly price of Bitcoin fluctuated extensively during the period from 255 USD to 10,404 USD.[18] The average ICO quality rating is 3.01 out of 5. Our descriptives also show that *Google news* sentiment was net negative, while Twitter was net positive. On average, 38 news articles were published in each quarter-country. Finally, the average period witnessed 285,000 USD hacked from exchanges, with a maximum of 702 million USD hacked in a quarter.

---- Insert Table 2 about here ----

We now analyze our main results. As previously mentioned, to reduce causality concerns, in all tables we use one period forward dependent variables. This means that all variables predict the dependent variable one quarter ahead. Table 3 reports the analysis with the number of ICOs launched in each quarter-country. Interpreting results from model 4, we find that prior to the ban the number of ICOs was increasing. The ban has a positive and significant impact on the number of ICOs in the short term (consistent with Hypothesis 1), but a negative and significant impact longer-term (consistent with Hypothesis 3). Overall, we find that the number of ICOs increased before and right after the ban and then decreased in the quarters after the ban. Running exponentiated coefficients allows us to compute the economic meaning of these variables. We find that, controlling for all other factors, the number of ICOs increased by 130% for each quarter

[18] Bitcoin reached an all-time high of about 20,000 USD in December 2017. However, our maximum value is lower because we average the daily price to obtain a quarterly value. In robustness tests we also control for Bitcoin volatility.

starting from the beginning of our sample, and received an additional boost of 83% by the ban, to then decrease by 21% for each quarter after the ban. Hence, we find statistically and economically meaningful results.

---- Insert Table 3 about here ----

Table 4 reports our analyses related to the average expert quality rating of ICOs launched. Investigating model 4, we find no significant change in the average ICO rating before the ban and right after the ban, but we do find a positive and significant increase in the average ICO rating after the ban. This evidence does not support Hypothesis 2, but is consistent with Hypothesis 4. Interpreting the coefficients, we can see that for each quarter after the ban, the average rating increased by 0.065. Considering that the average ICO rating at the time of the ban was 2.55, a 0.065 increase represents a 2.5% increase per each quarter from the ban. In other terms, each quarter after the ban, the average quality rating improved by approximately $1/10^{th}$ of a standard deviation. Therefore, we find statistically and, somewhat, economically meaningful results.

---- Insert Table 4 about here ----

Table 5 reports our analyses related to the number of low and high-quality ICOs. Models 1-4 investigate the effect of our predictors on the number of low rated ICOs in the next quarter, while models 5-8 investigate the number of high rated ICOs. Studying model 4, we find that the number of low rated ICOs significantly increased before the ban, continued to significantly increase in the quarter after the ban (consistent with Hypothesis 2), but then declined in the longer term (consistent with Hypothesis 4). Interestingly, looking at model 8, we find very limited significant changes in the number of high rated ICOs before and after the ban. The only significant coefficient is the China/South Korea ban that is positive and marginally significant at ten percent levels. However, this coefficient is not significant in models 6-7. Running exponentiated coefficients allows us to compute the economic meaning of these variables. We find that from the beginning of

our dataset, the number of low rated ICOs increased 141% each quarter. This might suggest that the majority of ICOs launched pre-ban were of low quality. We also find that the ban increased the number of low rated ICOs by 133%. Finally, we find that, post-ban, the number of *low* rated ICOs declined by 45% for each additional quarter after the ban, while the decline in the number of *high* rated ICOs is not significant. This latter finding is remarkable by itself given the significant turmoil (and decline) in the global ICO market in the post ban period. We come back to this interesting difference between low- and high-rated ICOs in our discussion.

---- Insert Table 5 about here ----

Robustness Tests

In order to ensure the robustness of our findings, we run various robustness tests, related to reverse causality concerns, endogeneity and other concerns.

Reverse causality and endogeneity concerns

In order to reduce reverse causality and endogeneity concerns, we implement various strategies. First, all our models incorporate independent variables and controls that are calculated one quarter before the dependent variable. This strategy is commonly used in the entrepreneurship, economics, and finance literature (e.g., Audretsch and Keilbach, 2004; Buch, Koch and Koetter, 2013; Clemens et al., 2012). Hence, every independent variable predicts the dependent variable in the next quarter.

However, as reported by Moral-Benito, Allison and Williams (2019), it could happen that our dependent variable at time t influences the independent variables at t + 1, biasing our results with a feedback loop. This particular form of reverse causality can be accounted for with predetermined regressors (Arellano, 2003). The panel Arellano-Bond estimator is the most popular alternative for estimating dynamic panels with unobserved heterogeneity and predetermined regressors (Moral-Benito et al., 2019). Hence, we re-run our main models with the use of a panel

Arellano-Bond estimator with robust standard errors. These models include the lag measure of the dependent variable. In Table 6 model 1, we test the impact of our predictors on the next quarter number of ICOs. In model 2, our dependent variable is the ICO average expert rating. Finally, in models 3 and 4, we turn our attention to the number of low- and high-rated ICOs. Results are identical to those reported in the main tables. The only difference is that the coefficient of the ban in model 4 is not significant, while it is positive and significant at ten percent in Table 5 model 8.

---- Insert Table 6 about here ----

Second, our main analyses test whether the ban has an effect on the quality of ICOs launched. However, rather than changing the quality of ICOs, it might be that the experts' composition or their perception change. Hence, we run a number of t-tests to rule out this alternative explanation. We test whether experts who are reviewing only before or only after the ban rate companies differently. We find that those reviewers who are only active before the ban give an average rating of 3.95, while reviewers who are only active after the ban give an average rating of 3.92. The difference is not statistically significant ($p = 0.53$). Further, the average review left *before* the ban by reviewers who are active only *before* the ban is 4.0, while the average review left *before* the ban by reviewers who are active *both* before and after the ban is 3.6. This difference is not statistically significant ($p = 0.14$). Further, the average review left *after* the ban by reviewers who are active only *after* the ban is 3.9, while the average review left *after* the ban by reviewers who are active *both* before and after the ban is 4.0. This difference is also not statistically significant ($p = 0.74$). Hence, our results are not driven by a change in experts' composition or perception.

Alternative econometric specifications

In addition to the robustness tests mentioned above, we also run a Generalized Estimating Equation (GEE), reported in Table 7. The GEE approach for modeling longitudinal data accounts for unobserved heterogeneity across countries and accounts for the lack of independence across

observations for the country (Ballinger, 2004). For all GEE models (*xtgee* in Stata), we used an autoregressive correlation structure of one period, which assumes autocorrelation across periods within the same country. This is appropriate considering that previous periods are correlated in terms of ICOs**.** We adopt a logarithmic link to account for potential non-linearity of our dependent variables. Further, for reasons previously explained, we adopt a negative binomial family in models 1, 3 and 4 and a Gaussian family for model 2. Finally, we use robust standard errors. The models' composition follows the same pattern outlined for Table 6. Results are in line with those reported in Tables 3 (number of ICOs), Table 4 (average quality rating) and Table 5 (number of low and high quality ICOs). These results lend further support to our hypotheses.

---- Insert Table 7 about here ----

ICO fundraising volume

In our main analyses, we control for investors' appetite by including Bitcoin price and *Google trend*, which accounts for changes in Internet searches for ICOs. We further control for media sentiment. We run an additional test using the *ICO value* (in USD) as dependent variable, which captures the intersection between demand and supply for ICOs. This variable is measured as the cumulative fundraising by all ICOs launched in each country-quarter. In some cases, icobench.com reports the amount in crypto-coins (e.g., 3,000 Bitcoins) raised, rather than a USD value. In those cases, we compute the USD equivalent at the ICO launch by looking at the exchange rate between the coins and the USD.

Table 8 reports our results related to the value of fundraising for ICOs in each country-quarter. When interpreting results from model 4, we find that before the ban the value fundraised was increasing significantly. Our results also show that the value of fundraising was not impacted by the ban in the short term, meaning that investors did not follow entrepreneurs in rushing to the market immediately after the ban. In the long term, however, the value significantly decreased.

---- Insert Table 8 about here ----

Additional tests

We argue that in the short term, because of regulatory uncertainty, entrepreneurs with existing ICO plans rush to the market (i.e., Hypothesis 1). An alternative explanation of our short-term findings is that right after the ICO ban in China/South Korea, entrepreneurs in other countries had their ICOs lined up and could not easily withdraw the ICO. However, this explanation is not reasonable for two reasons. First, ICOs can be withdrawn quickly and unilaterally by the entrepreneur. The China ban happened on the 4th and South Korea on the 29th of September 2017. All around the world, we have only 21 ICOs starting from 1st to 7th of September and 42 from 26th of September to 2nd of October. These ICOs represent 0.37% and 0.75% of our sample, very small proportions, which cannot explain our economically very significant results. Second, this alternative explanation is not consistent with the observed decline in the quality of the ICOs immediately after the ban.

We also ran different models and additional control variables. First, it might be argued that international news is just as relevant as local news. Although *Google News* also reports international news, it might be skewed in local news in a local language. For example, an article published in the Financial Times (UK newspaper) is going to be read in other countries and, consequently, affect ICO activity in those countries. Therefore, it would be sensible to control for worldwide *Google news* and, as a robustness test, we use this measure rather than the country-specific measure. Results are consistent with those reported.

Second, we include additional control variables. In particular, we control for additional economic variables that might affect ICO activity, such as the "ease of getting credit" reported by the World Bank. If entrepreneurs can easily raise credit, they might be less inclined to launch an ICO. We further control for Bitcoin volatility. It might be argued that higher volatility renders

fundraising and investments less predictable, harming the industry. Results are consistent with those reported.

Further, we have selected the top and bottom ten percent in terms of ICO quality ratings. In robustness tests, we test the sensitivity of our findings to different levels. We therefore try using the top and bottom five and fifteen percent. In both tests, we have identical results for the low rating ICOs. In terms of high rating ICOs, we find very similar results. The only significant difference arises in the top fifteen percent of ICOs where the ban coefficient is positive but not significant, and the *Pre ban slope* is positive but significant. Overall, these results provide further support for our findings.

Finally, we run a VIF analysis to investigate whether multicollinearity is an issue in our sample. We find that multicollinearity is not an issue of concern when interpreting our findings because VIFs are below the threshold of 10 (Kutner, Neter, Nachtsheim, and Wasserman, 2004). However, in Table 3, we find that Bitcoin price has a high VIF value. This is not surprising considering that Bitcoin is a thermometer for the industry, and it is, therefore, related to other variables. Although it is safe to ignore high VIFs related to variables that only serve as controls,[19] we re-run our analyses related to Table 3 removing the variable of Bitcoin price. The average VIF is 2.23 and the maximum VIF is 5.65, well within acceptable standards. Also, with the exclusion of Bitcoin price our results do not change.

DISCUSSION AND CONCLUSION

This paper extended institutional theory and evidence to the context of ICOs—an innovative entrepreneurial finance market (e.g., Fisch, 2019). Unlike other contexts, ICOs are unique because they may operate independently of a national identity. Consequently, it is unclear

[19] Source: https://statisticalhorizons.com/multicollinearity

the extent to which ICOs are in fact related to country regulatory institutions. We developed new hypotheses pertaining to government regulations and, more specifically, how changes in country regulatory institutions influence ICO activity in other countries. We developed an institutional theory of regulatory spillovers, which suggests that regulatory bans in specific countries can have different short-term and long-term spillover effects from one jurisdiction to another. The data examined comprised ICO activity from up to 108 countries between Q3 2015 and Q3 2019. The data is consistent with the view that the China/South Korea ICO ban—the most notable regulatory event during the period of our study—impacts the number and quality of ICOs in other countries, and that short-term and long-term spillover effects are fundamentally different.

Academic Contributions

Our study makes several contributions to multiple literature streams. Understanding the functioning and dynamics of innovative entrepreneurial finance markets, such as the ICO market, is a premier topic in entrepreneurial finance and the broader entrepreneurship literature (Bellavitis et al., 2017; Block et al., 2018, 2020; Fisch et al., 2019; Martino et al., 2019). Our study adds to an emerging literature on ICOs. Most closely related to our work is the paper by Huang et al. (2019), who examine the relationship between factor markets and institutions in specific countries and ICO activity in those countries using a cross-sectional dataset of ICO activity covering more than 100 countries. We bring new longitudinal evidence on (a) how regulatory changes may have spillover effects in other countries and (b) how these regulatory spillover effects are different in the short-term versus the long-term.

Specifically, our data shows that in the short-term the China/South Korea ban has increased the number of ICOs in other countries. Accordingly, in the short-term, entrepreneurs rushed to the market to launch ICOs in other countries. Consistent with our expectations, this short-term rush was predominantly comprised of lower-rated ICOs. In the longer-term, however, the China/South

Korea ban has decreased the number of ICOs, as well as the fundraising volume in other countries. Notably, in the longer-term, there is a more positive trend in the average quality of ICOs in other countries, and especially lower-rated ICOs gradually disappeared from the ICO market.

The different patterns in lower-rated ICOs and higher-rated ICOs in the short-term and longer-term after the China/South-Korea ban is especially noteworthy. Our findings suggest that in the short-term, the ban triggered a sharp increase in ICOs. This increase is related to lower-rated ICOs, which rushed to the market amid expectations of a closing window of opportunity. In contrast, higher-rated ICOs need careful planning as they cannot easily be sped up. Accordingly, the number of higher-quality ICOs did not jump in the short-term after the ban. In the longer-term, the number of lower-quality ICOs kept gradually decreasing over time. Our estimates suggest a drop in ICOs of about 21% *for each quarter after the ban*, which is much larger than the best estimate of the number of ICO frauds in academic work. Hornuf et al. (2019) identify about 20% of all ICOs from September 2016 to July 2018 as confirmed or suspected fraud cases.[20] Consequently, the longer-term drop in ICOs after the China/South Korea ICO ban is unlikely to be exclusively driven by a reduced number of outright fraud cases but is also driven by a reduced number of genuine lower-quality ICOs. Moreover, our findings also show that in the longer-term after the ban, a very robust set of higher-quality ICOs entered the market. The resilience of higher-quality ICOs is remarkable by itself, given the extreme turbulence and significant contraction experienced by the global ICO market in the post-ban period.

[20] Although some practitioner reports (https://research.bloomberg.com/pub/res/d28giW28tf6G7T_Wr77aU0gDgFQ) have reported much higher fraud cases compared to Hornuf et al. (2019), these practitioner reports also suggest that ICO funding volume is largely unaffected by the fraud cases (estimates suggest only about 11% of funding went to identified fraud cases; and when three big scams were removed only 0.3% of all time ICO fundraising went to fraud cases). Still, our findings show a much sharper drop in ICO funding volume in the longer-term after the China/South-Korea ban. This fact again suggests that fraud cases alone do not drive our findings related to lower-quality ICOs.

Our theory, and related empirical evidence, also contribute outside the ICO literature and, more specifically, to the literature at the intersection of entrepreneurship and institutional theory (Bruton et al., 2010; Tolbert et al., 2011). Extant entrepreneurship research drawing on institutional theory has almost exclusively focused on how country institutions influence the breadth and depth of "traditional" entrepreneurial finance markets, such as their venture capital markets (e.g., Groh et al., 2010; Li and Zahra, 2012), or the quantity and quality of entrepreneurship (e.g., Armour and Cumming, 2008; Estrin et al., 2013; Stenholm et al., 2013) within the same country. Within this literature, governments, for example, are often depicted as powerful actors, who through rule-setting and coercive pressures (i.e., monitoring and sanctioning activities) influence entrepreneurial finance markets and entrepreneurship within their own jurisdiction. Implicitly, these same governments are assumed to have a limited impact outside their own jurisdiction, or, at a minimum, such possible effects are not the focus of investigation.

We present an institutional theory of regulatory spillover that brings a novel perspective to extant entrepreneurship research that draws on institutional theory. We show that national governments are impactful not only within their own jurisdictions. In an increasingly digital, global, and decentralized world, governments, through their regulatory actions, can also influence entrepreneurship and entrepreneurial finance markets, such as ICO markets, outside their own jurisdiction (i.e., in other countries). We specifically argue that regulatory actions by governments, such as the ICO ban in China and South Korea, may increase regulatory uncertainty in other countries and affect the institutional legitimacy of an entrepreneurial finance practice. Accordingly, a ban in one country can affect people's behavior and market dynamics in other countries, even when the governments that ban ICOs have no coercive powers in other jurisdictions.

Our theory and empirical evidence that an ICO ban can have fundamentally different short-term and longer-term effects also contribute to extant literature at the intersection of

entrepreneurship and institutional theory. Most of this literature has presented a more static perspective on how specific (regulatory) institutions relate to entrepreneurship and/or examines whether specific institutions are "good" *or* "bad" for entrepreneurial finance markets or entrepreneurship (see Lee et al., 2011). Our evidence suggests that the same ban might, in the short-term, have negative consequences in that it causes a low-quality rush of ICOs in other countries. At the same time, in the long-term, the ban cools down the market but has positive consequences in that the average quality of ICOs increases.

Taken together, we want to come back to the opening question from the introduction of our paper. With the development of innovative entrepreneurial financing practices such as ICOs, an important question in entrepreneurship theory and practice arises as to whether or not country regulatory institutions still matter in this context, and if so, how? Common wisdom suggests that a regulatory ban in one or two countries will have "no effect in the physical space" that is increasingly digital, global and decentralized; if anything, it may only harm the markets and entrepreneurship in the countries that ban.[21] Our theory and evidence point to the opposite. Regulatory institutions still matter in an increasingly digital, global and decentralized world. Regulatory spillovers, in particular, can be very impactful. By focusing on such regulatory spillovers and their distinct short-term and long-term effects, our study provides important theoretical and empirical contributions to entrepreneurship research and institutional theory.

Limitations and Avenues for Future Research

Our study has several limitations that may be addressed by future research. Although we have controlled for market factors such as the capitalization of public markets, we have studied ICOs in isolation from other entrepreneurial finance sources. It would be interesting to understand

[21] Source: https://bravenewcoin.com/insights/china-ico-ban-proving-ineffective

how different markets interact. For example, future studies could explore how and whether business angel, venture capital, crowdfunding and ICO markets interact. Similarly, it would be interesting to explore whether regulation has not only a cross-country impact, but also a cross-market influence (e.g., ICO regulation has an impact on crowdfunding).

We currently study the ICO ban on ICO launches in countries other than China and South Korea. It would be interesting to study how regulatory changes in one country affect regulatory initiatives in other countries. At the same time, the regulatory environment, especially for ICOs, changes fast. It would be interesting to investigate the impact of regulatory changes beyond the ban, for example through regulation other than a ban.

As financial technology continues to evolve, further studies on the causes and consequences of such innovations for entrepreneurship and finance are warranted. It is natural to envisage that these studies in international contexts will be linked to their institutional settings. Innovations in financial technology, however, have the potential to become increasingly disconnected from national institutions. Through new financial technologies, there is potential for regulatory spillovers from one to another region, as we have seen here with ICO bans. Overall, financial technology innovations in the future will likely offer many new promising avenues to further develop institutional theory and settings to test these theories.

As more time passes in the post-Covid pandemic environment, we may expect reduced access to finance for entrepreneurial ventures. As such, there is reason to believe that ICOs might see a comeback in a more digital post-pandemic environment, and there might be pressures to ease regulations to enable more ICOs. These types of developments could offer additional opportunities for future work.

Practical Implications for Policy-makers and Entrepreneurs

Our theory and empirical evidence indicate that the ICO bans in China and South Korea influenced ICO numbers and quality in other countries. From a policy perspective, this finding is particularly important as it shows the importance of international coordination in ICO regulation and policies. National regulators and policymakers cannot operate independently in a vacuum without regard to other countries' policies towards ICOs. Our findings entail both a cautionary note and a promising note. Policymakers should be particularly concerned that regulatory actions in other countries can, for example, create a rush of lower-rated ICOs in their own jurisdictions. However, our findings also suggest that regulatory actions, in specific countries, can eventually have positive effects in other jurisdictions, for example, by increasing the average quality rating of ICOs in the longer term. Regulators should be mindful of the effect of international regulation on both the size and quality of their ICO market. It is important to ensure quality standards, but also leave room for entrepreneurs to operate without prohibitive legal obstacles.

The development of innovative entrepreneurial finance markets is a critical policy concern because these markets influence entrepreneurs and entrepreneurship. Entrepreneurs, especially those with high growth potential, often require external financial resources to realize their potential (Cassar, 2004). However, it is also well-known that entrepreneurs frequently experience constraints in accessing sufficient external funds. The ICO market represents a new source of financing for entrepreneurs. Accordingly, it enlarges the range of external financing sources that are available to them. Our findings suggest that the ICO market has changed dramatically after the China/South Korea ICO ban. The number of ICOs launched, albeit lower than in the pre-ban period, is still plentiful and their average quality has increased. For entrepreneurs interested in approaching the ICO market, these findings suggest that the hurdles to raise money have increased. Accordingly, more time and other resources may be required to develop successful ICO plans. Our findings further suggest that entrepreneurs that are actively preparing for an ICO need not only monitor the

regulatory environment in their own jurisdictions but also in other countries. Regulatory changes in other countries can have a significant impact on the environment in which entrepreneurs will potentially raise ICO funding.

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Tables and Figure

Figure 1: Average ICO rating and number of high/low rating ICOs launched (Q3 2015 – Q3 2019)

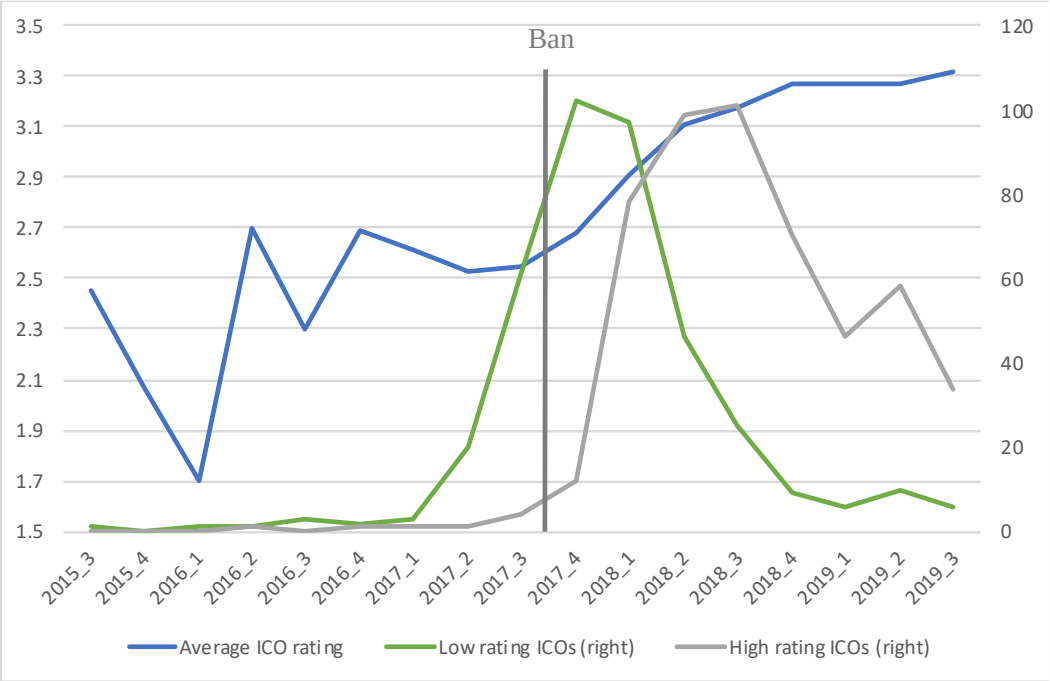

Table 1: Variable description

Variable name	Description	Unit of observation	Data source
No. of ICO	Number of ICOs launched in each country. We code each ICO based on the country reported on ICO Bench. When the ICO cannot be attributed to any particular country, we defined it as "global"	Country-quarter or Global-quarter	Icobench.com (Adhami et al. 2018)
Value of ICOs	Amount raised (in USD) by the ICOs launched in each country.	Country-quarter	Icobench.com
ICO rating	Average rating received by ICOs launched in each country.	Country-quarter	Icobench.com
No. of Low Rating ICOs	Number of ICOs launched in each country with a rating in top decile (below or equal to 2 out of 5)	Country-quarter	Icobench.com
No. of High Rating ICOs	Number of ICOs launched in each country with a rating in top decile (above or equal to 4 out of 5)	Country-quarter	Icobench.com
Domestic market capitalization	Sum of the capitalization of all public markets in a given country. Log transformed.	Country-quarter	World Federation of Exchanges
Bitcoin price	Average quarterly Bitcoin price. Log transformed.	Country-quarter	Coindesk
Google trend (ICO)	Standardized Google search for the word "Initial coin offering". Results are standardized within and across countries. United States is the reference country for cross-country standardization.	Country-quarter	Google Trends
GDP growth	Percentage growth in GDP per capita. Winsorized.	Country-year	IMF
GDP per capita	GDP per capita in USD. Log transformed.	Country-year	IMF
Inflation	Change in consumer prices. Winsorized.	Country-year	IMF
Internet penetration	Percentage of population with Internet access	Country-year	ITU/ Internetworldstats
Google news	Number of news related to ICOs reported on Google News for each country-quarter. Log transformed.	Country-quarter	Google News
Twitter activity	Number of Tweets and replies published in ICO channels in each country. Log transformed.	Country-quarter	Twitter
Google news sentiment	Percentage of positive minus negative sentiment for Google news	Country-quarter	Google News
Twitter sentiment	Percentage of positive minus negative sentiment for Twitter posts and replies	Country-quarter	Twitter
Hacks in any country value	Sum of value in USD of all exchange hacks around the world in each quarter. Log transformed.	Global-quarter	Various sources
Pre ban slope	Variable that counts the number of quarters starting from 1 at the beginning of our data and then increasing for each quarter up to 8 in Q2 2017 (quarter prior to the China / South Korea ICO ban) and then continuing with the same value (8) till the end of our data in Q3 2019.	Country-quarter	/
China/South Korea ICO ban	Dummy variable coded as 1 if ICOs have been banned in any country-quarter (i.e., China, South Korea). The dummy is the same for all countries in our dataset.	Country-quarter	China and South Korea governments
Post ban slope	Variable that counts the number of quarters from the China / South Korea ICO ban starting with 1 in Q3 2017 and then increasing for each quarter up to 5 in Q3 2019.	Country-quarter	/

Table 2: Descriptive statistics and correlations

		Obs.	Mean	S. D.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	No. of ICOs	2227	1.68	6.88	0.00	101.00																				
2	Value of ICOs	2227	3.03	6.33	0.00	21.25	0.52*																			
3	ICO rating	608	3.01	0.62	1.00	4.70	0.01	0.10*																		
4	no. of Low Rating ICOs	2227	0.15	0.91	0.00	19.00	0.78*	0.37*	-0.20*																	
5	no. of High Rating ICOs	2227	0.22	1.05	0.00	17.00	0.80*	0.46*	0.22*	0.43*																
6	Domestic market cap (ln)	2117	5.46	6.01	0.00	17.39	0.23*	0.28*	-0.13*	0.20*	0.16*															
7	Bitcoin price (ln)	2227	7.67	1.30	5.54	9.25	0.22*	0.36*	0.16*	0.15*	0.19*	-0.00														
8	Google trend	2158	8.54	12.71	0.00	81.00	0.33*	0.40*	0.17*	0.32*	0.19*	0.19*	0.42*													
9	GDP growth (w)	1921	2.86	2.42	-7.10	8.10	-0.00	0.06*	-0.08	-0.00	-0.00	-0.00	0.04*	0.11*												
10	GDP per capita (ln)	1904	9.21	1.25	6.22	11.65	0.21*	0.27*	0.06	0.15*	0.19*	0.35*	0.03	0.11*	-0.23*											
11	Inflation (w)	1913	4.48	13.07	-1.60	121.70	-0.03	-0.07*	0.06	-0.03	-0.03	-0.09*	0.04*	-0.03	-0.41*	-0.20*										
12	Internet penetration	2213	72.29	20.41	7.70	98.90	0.12*	0.15*	0.06	0.07*	0.12*	0.16*	0.07*	0.15*	-0.14*	0.55*	-0.12*									
13	Google news (ln)	2227	5.10	3.66	0.00	15.66	0.12*	0.28*	0.09*	0.07*	0.10*	0.22*	0.46*	0.31*	0.03	0.14*	0.03	0.21*								
14	Twitter activity (ln)	2227	2.28	2.84	0.00	10.06	0.47*	0.66*	0.30*	0.29*	0.44*	0.30*	0.54*	0.38*	0.03	0.34*	-0.05	0.19*	0.43*							
15	Google News sentiment	2227	-0.25	0.02	-0.07	0.04	-0.07*	-0.09*	-0.15*	-0.02	-0.08*	0.00	-0.24*	-0.13*	-0.00	-0.00	-0.00	-0.01	-0.09*	-0.15*						
16	Twitter sentiment	2227	0.13	0.21	-1.00	1.00	0.21*	0.39*	0.26*	0.11*	0.23*	0.18*	0.41*	0.26*	0.03	0.25*	-0.05*	0.16*	0.35*	0.67*	-0.10*					
17	Hacks in any country value (ln)	2227	12.56	7.27	0.00	20.37	0.15*	0.25*	-0.07	0.10*	0.13*	-0.01	0.46*	0.30*	0.04	0.01	0.01	0.04	0.24*	0.27*	-0.12*	0.21*				
18	Protecting minority investors	1904	58.73	12.46	10.00	85.00	0.15*	0.20*	0.00	0.11*	0.13*	0.35*	0.08*	0.21*	0.14*	0.31*	-0.22*	0.27*	0.29*	0.25*	-0.02	0.18*	0.03			
19	Pre ban slope	2227	6.35	2.35	1.00	8.00	0.17*	0.30*	0.14*	0.11*	0.14*	-0.00	0.89*	0.31*	0.06*	0.03	0.05*	0.08*	0.41*	0.44*	-0.19*	0.33*	0.54*	0.07*		
20	China / Korea Ban	2227	0.52	0.49	0.00	1.00	0.22*	0.35*	0.21*	0.13*	0.19*	-0.00	0.92*	0.39*	0.03	0.03	0.04	0.07*	0.46*	0.55*	-0.19*	0.42*	0.43*	0.07*	0.74*	
21	Post ban slope	2227	2.64	3.12	0.00	9.00	0.11*	0.21*	0.44*	0.01	0.17*	-0.00	0.75*	0.11*	-0.02	0.03	0.04	0.05*	0.39*	0.50*	-0.23*	0.40*	0.18*	0.08*	0.79*	0.59*

Absolute correlations with * significant at $p < 0.005$. Variables with (ln) have been logarihm transformed to reduce overdispersion, while variables with (w) have been winsorized to reduce the influence of outliers.

Table 3. The effect of the ban on the number of ICOs launched

	Model 1	Model 2	Model 3	Model 4
Domestic market cap (ln)	0.011	0.011	0.025	0.02
	[0.025]	[0.025]	[0.028]	[0.032]
Bitcoin price (ln)	0.967***	0.959***	0.204†	0.254**
	[0.077]	[0.109]	[0.108]	[0.090]
Google trend	0.013***	0.013***	0.023***	0.007**
	[0.002]	[0.002]	[0.002]	[0.002]
GDP growth (w)	0.131**	0.131**	0.068†	-0.089*
	[0.043]	[0.043]	[0.041]	[0.040]
GDP per capita (ln)	0.347*	0.347*	0.570**	0.586**
	[0.164]	[0.164]	[0.190]	[0.227]
Inflation (w)	0.016	0.016	0.006	-0.017
	[0.013]	[0.013]	[0.013]	[0.014]
Internet penetration	-0.003	-0.003	-0.017*	-0.015†
	[0.007]	[0.007]	[0.007]	[0.008]
Google news (ln)	0.007	0.007	-0.030	0.008
	[0.028]	[0.028]	[0.026]	[0.027]
Twitter activity (ln)	0.002	0.001	0.022	0.148***
	[0.030]	[0.031]	[0.030]	[0.032]
Google News sentiment	10.757***	10.736***	9.292***	3.352*
	[1.540]	[1.553]	[1.514]	[1.438]
Twitter sentiment	0.02	0.02	0.044	0.183
	[0.243]	[0.243]	[0.230]	[0.216]
Hacks in any country value (ln	0.009	0.009	-0.026*	-0.008
	[0.014]	[0.014]	[0.011]	[0.011]
Protecting minority investors	-0.007	-0.007	-0.002	0.004
	[0.012]	[0.012]	[0.013]	[0.015]
Pre ban slope			0.822***	0.863***
			[0.091]	[0.087]
China/South Korea ban		0.027	0.269	0.606***
		[0.250]	[0.169]	[0.134]
Post ban slope				-0.245***
				[0.022]
Constant	-10.576***	-10.522***	-11.191***	-12.049***
	[1.594]	[1.670]	[1.896]	[2.169]
Observations (Countries)	1444 (92)	1444 (92)	1444 (92)	1444 (92)
VIF	1.80	2.61	4.36	4.52
Chi square	830.7***	830.4***	696.6***	949.4***

All models fit a panel negative binomial regression (xtnbreg). This is appropriate considering that the dependent variable is a count measure, overdispersed and with many zeroes. We include country fixed effects to account for unobserved heterogeneity. All variables are lagged by one period. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).

Table 4. The effect of the ban on the average rating of ICOs launched

	Model 1	Model 2	Model 3	Model 4
Domestic market cap (ln)	0.036	0.036	0.036	0.042
	[0.043]	[0.043]	[0.043]	[0.042]
Bitcoin price (ln)	0.197**	0.202*	0.211*	0.203*
	[0.068]	[0.082]	[0.093]	[0.092]
Google trend	-0.007***	-0.007***	-0.007***	-0.003
	[0.002]	[0.002]	[0.002]	[0.002]
GDP growth (w)	-0.143***	-0.144***	-0.142***	-0.088*
	[0.038]	[0.038]	[0.039]	[0.042]
GDP per capita (ln)	0.655	0.653	0.685	0.026
	[0.654]	[0.656]	[0.674]	[0.701]
Inflation (w)	-0.065*	-0.065*	-0.064†	-0.05
	[0.032]	[0.033]	[0.034]	[0.034]
Internet penetration	-0.003	-0.003	-0.003	-0.003
	[0.007]	[0.007]	[0.007]	[0.007]
Google news (ln)	-0.008	-0.008	-0.007	-0.016
	[0.028]	[0.028]	[0.028]	[0.028]
Twitter activity (ln)	0.028	0.028	0.028	0.005
	[0.023]	[0.023]	[0.023]	[0.024]
Google News sentiment	-0.538	-0.523	-0.413	0.275
	[1.152]	[1.162]	[1.276]	[1.283]
Twitter sentiment	0.686***	0.685***	0.681***	0.650***
	[0.167]	[0.168]	[0.169]	[0.168]
Hacks in any country value (ln)	0.002	0.002	0.002	0.001
	[0.008]	[0.008]	[0.008]	[0.008]
Protecting minority investors	0.055*	0.055*	0.055*	0.042†
	[0.022]	[0.022]	[0.022]	[0.022]
Pre ban slope			-0.012	-0.011
			[0.055]	[0.055]
China/South Korea ban		-0.014	-0.019	-0.16
		[0.132]	[0.134]	[0.140]
Post ban slope				0.065**
				[0.021]
Constant	-8.082	-8.087	-8.404	-1.335
	[6.300]	[6.308]	[6.492]	[6.835]
Observations (Countries)	504 (92)	504 (92)	504 (92)	504 (92)
VIF	1.72	2.06	2.30	2.47
R-squared	0.288	0.288	0.288	0.305

All models fit a panel linear regression (xtreg). This is appropriate considering that the dependent variable is continuous and normally distributed. We include country fixed effects to account for unobserved heterogeneity. All variables are lagged by one period. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).

Table 5. The effect of the ban on the number of low and high quality ICOs launched

Dependent variable	no. of Low Rating ICOs				no. of High Rating ICOs			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Domestic market cap (ln)	-0.148	-0.157	-0.204	0.361†	0.049	0.046	0.045	0.077
	[0.192]	[0.187]	[0.320]	[0.212]	[0.131]	[0.137]	[0.139]	[0.153]
Bitcoin price (ln)	1.197***	1.111***	0.051	0.545*	1.161***	0.949***	0.895***	0.882***
	[0.185]	[0.234]	[0.258]	[0.222]	[0.183]	[0.221]	[0.233]	[0.229]
Google trend	0.018***	0.019***	0.036***	0.001	0.009*	0.010*	0.011*	0.006
	[0.005]	[0.005]	[0.006]	[0.007]	[0.004]	[0.004]	[0.004]	[0.006]
GDP growth (w)	0.239*	0.248*	0.162	-0.339*	-0.073	-0.066	-0.072	-0.128
	[0.121]	[0.120]	[0.128]	[0.143]	[0.087]	[0.086]	[0.086]	[0.094]
GDP per capita (ln)	0.661	0.683	0.849	0.603	1.368†	1.510†	1.537†	1.457†
	[0.450]	[0.446]	[0.617]	[1.060]	[0.773]	[0.791]	[0.797]	[0.809]
Inflation (w)	0.045	0.051	-0.012	-0.279*	-0.113	-0.108	-0.115	-0.148
	[0.094]	[0.093]	[0.116]	[0.119]	[0.085]	[0.084]	[0.086]	[0.091]
Internet penetration	0.022	0.022	-0.002	0.032	-0.028	-0.029	-0.031	-0.027
	[0.020]	[0.020]	[0.021]	[0.031]	[0.021]	[0.021]	[0.021]	[0.021]
Google news (ln)	-0.064	-0.068	-0.134†	-0.029	0.076	0.061	0.061	0.069
	[0.063]	[0.063]	[0.069]	[0.088]	[0.080]	[0.078]	[0.078]	[0.078]
Twitter activity (ln)	-0.227**	-0.241**	-0.197*	0.041	0.209*	0.167†	0.167†	0.206*
	[0.075]	[0.079]	[0.080]	[0.084]	[0.085]	[0.089]	[0.089]	[0.093]
Google News sentiment	15.314***	15.006***	19.342***	4.495	7.706**	6.453*	6.027†	4.774
	[3.517]	[3.565]	[4.259]	[4.435]	[2.956]	[3.109]	[3.165]	[3.271]
Twitter sentiment	-0.781	-0.76	-0.518	0.057	0.710	0.798	0.811	0.844
	[0.666]	[0.669]	[0.683]	[0.631]	[0.585]	[0.586]	[0.587]	[0.590]
Hacks in any country value (ln)	-0.009	-0.008	-0.040†	-0.021	-0.020	-0.028	-0.035	-0.017
	[0.025]	[0.025]	[0.023]	[0.019]	[0.037]	[0.040]	[0.040]	[0.043]
Protecting minority investors	0.013	0.013	0.008	-0.088	0.016	0.012	0.012	0.026
	[0.031]	[0.031]	[0.040]	[0.070]	[0.068]	[0.068]	[0.069]	[0.072]
Pre ban slope			0.917***	0.883***			0.145	0.132
			[0.171]	[0.173]			[0.213]	[0.217]
China/South Korea ban		0.296	0.697†	0.847**		0.975	0.850	1.042†
		[0.506]	[0.361]	[0.262]		[0.609]	[0.608]	[0.611]
Post ban slope				-0.603***				-0.08
				[0.080]				[0.054]
Constant	-15.665***	-15.211***	-11.145*	-11.599	-21.600**	-21.172**	-21.646**	-22.025**
	[4.012]	[4.121]	[5.335]	[9.535]	[6.967]	[7.105]	[7.234]	[7.313]
Observations (Countries)	788 (50)	788 (50)	788 (50)	788 (50)	825 (52)	825 (52)	825 (52)	825 (52)
Chi square	164.6***	164.6***	143.5***	247.5***	196.9***	179.3***	171.4***	174.3***

All models fit a panel negative binomial regression (xtnbreg). This is appropriate considering that the dependent variable is a count measure, overdispersed and with many zeroes. We include country fixed effects to account for unobserved heterogeneity. All variables are lagged by one period. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).

Table 6. The effect of the ban on the different dependent variables. Arellano-Bond models.

Dependent variable	No of ICOs	ICO rating	ICOs Low rating	ICOs High rating
	Model 1	Model 2	Model 3	Model 4
Lag (1) dependent variable	0.715***	-0.126	0.629***	0.422**
	[0.037]	[0.086]	[0.038]	[0.158]
Domestic market cap (ln)	0.230	0.023	-0.023	0.004
	[0.284]	[0.017]	[0.025]	[0.020]
Bitcoin price (ln)	-1.314*	0.194†	-0.073	0.092
	[0.612]	[0.107]	[0.097]	[0.109]
Google trend	0.089**	-0.002	-0.008	0.020**
	[0.032]	[0.003]	[0.007]	[0.006]
GDP growth (w)	-0.026	0.003	-0.025	0.009
	[0.085]	[0.068]	[0.017]	[0.020]
GDP per capita (ln)	-4.336	3.238*	-0.552	-0.566
	[3.658]	[1.391]	[0.534]	[0.486]
Inflation (w)	0.004	0.040	-0.004	-0.003
	[0.025]	[0.051]	[0.003]	[0.003]
Internet penetration	-0.049†	-0.001	-0.003	-0.003
	[0.028]	[0.009]	[0.003]	[0.003]
Google news (ln)	0.140	-0.041†	-0.011	0.003
	[0.175]	[0.024]	[0.024]	[0.031]
Twitter activity (ln)	-0.086	-0.022	-0.011	0.012
	[0.106]	[0.043]	[0.019]	[0.019]
Google News sentiment	6.607***	0.292	0.881*	1.036*
	[1.786]	[1.564]	[0.393]	[0.403]
Twitter sentiment	-0.265	0.249	-0.068	-0.009
	[0.476]	[0.261]	[0.164]	[0.087]
Hacks in any country value (ln)	-0.040*	-0.007	-0.004	-0.007*
	[0.019]	[0.012]	[0.003]	[0.003]
Protecting minority investors	0.161	0.092*	0.012	0.011
	[0.106]	[0.040]	[0.019]	[0.012]
Pre ban slope	0.654*	-0.074	0.094*	-0.016
	[0.261]	[0.084]	[0.037]	[0.024]
China/South Korea ban	2.045**	-0.110	0.358**	-0.005
	[0.729]	[0.139]	[0.130]	[0.063]
Post ban slope	-0.344**	0.090**	-0.079*	0.014
	[0.128]	[0.032]	[0.031]	[0.012]
Constant	38.026	-35.394**	5.158	4.187
	[35.121]	[13.680]	[4.475]	[4.488]
Observations (Countries)	1502 (108)	287 (57)	1502 (108)	1502 (108)
Chi square	2051.51***	106.55***	1061.51***	89.77***

All models are Arellano-Bond linear dynamic panel-data estimation models (xtabond). These models include a lagged dependent variable as predictor, assuming correlation across periods. Each model has a different dependent variable. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).

Table 7. The effect of the ban on the different dependent variables. GEE models.

Dependent variable	No of ICOs	ICO rating	ICOs Low rating	ICOs High rating
	Model 1	Model 2	Model 3	Model 4
Domestic market cap (ln)	0.041*	-0.005**	0.091***	-0.030
	[0.021]	[0.002]	[0.025]	[0.021]
Bitcoin price (ln)	-0.024	0.032	0.091	0.681**
	[0.129]	[0.040]	[0.260]	[0.215]
Google trend	0.009*	0.001	0.004	0.002
	[0.004]	[0.001]	[0.009]	[0.007]
GDP growth (w)	0.064	-0.005	-0.012	0.080
	[0.043]	[0.005]	[0.068]	[0.069]
GDP per capita (ln)	0.301***	0.013	0.034	0.291*
	[0.084]	[0.013]	[0.165]	[0.123]
Inflation (w)	0.004	0.000	-0.041	0.015
	[0.007]	[0.006]	[0.030]	[0.012]
Internet penetration	-0.007	0.000	-0.000	-0.000
	[0.006]	[0.001]	[0.008]	[0.008]
Google news (ln)	-0.007	0.006***	-0.042†	-0.022
	[0.017]	[0.002]	[0.024]	[0.026]
Twitter activity (ln)	0.501***	0.004	0.488***	0.770***
	[0.062]	[0.006]	[0.082]	[0.077]
Google News sentiment	5.795**	0.261	4.748	9.917**
	[2.120]	[0.686]	[5.172]	[3.557]
Twitter sentiment	-0.663*	0.160**	-1.473*	-0.566
	[0.332]	[0.058]	[0.641]	[0.542]
Hacks in any country value (ln)	-0.025*	0.002	-0.026	0.018
	[0.011]	[0.004]	[0.021]	[0.059]
Protecting minority investors	0.005	-0.000	0.020*	0.007
	[0.006]	[0.001]	[0.009]	[0.009]
Pre ban slope	0.829***	-0.061*	0.667***	-0.073
	[0.099]	[0.024]	[0.186]	[0.214]
China/South Korea ban	0.307	-0.008	0.742†	0.162
	[0.199]	[0.064]	[0.405]	[0.651]
Post ban slope	-0.290***	0.032***	-0.651***	-0.107†
	[0.035]	[0.007]	[0.096]	[0.058]
Constant	-10.068***	0.976***	-9.925***	-13.788***
	[1.092]	[0.212]	[2.032]	[1.783]
Observations (Countries)	1,563 (103)	234 (30)	1,563 (103)	1,563 (103)
Chi square	1391.0***	262.7***	497.5***	760.1***

All models are GEE models. These models fit population-averaged panel-data models. All models fit a log link function and an autoregressive correlation structure of one period, which assumes autocorrelation across periods within the same country. This is appropriate considering that previous periods are correlated in terms of ICOs. The use of a logarithmic link is appropriate for non-linear distributions such as those encountered in the ICO context. Models 1, 3 and 4 implement a negative binomial family. Model 2 implements a normal Gaussian family. Finally, we use robust standard errors. All variables are lagged by one period. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).

Table 8. The effect of the ban on the ICO fundraising volume

	Model 1	Model 2	Model 3	Model 4
Domestic market cap (ln)	0.515**	0.489*	0.470*	0.400*
	[0.198]	[0.196]	[0.195]	[0.193]
Bitcoin price (ln)	0.772**	1.846***	0.073	0.115
	[0.246]	[0.312]	[0.495]	[0.488]
Google trend	0.122***	0.120***	0.142***	0.095***
	[0.012]	[0.012]	[0.013]	[0.015]
GDP growth (w)	0.141	0.083	0.049	-0.029
	[0.100]	[0.100]	[0.100]	[0.099]
GDP per capita (ln)	0.343	0.525	0.002	1.963
	[1.558]	[1.543]	[1.537]	[1.545]
Inflation (w)	-0.004	-0.007	-0.016	-0.006
	[0.028]	[0.028]	[0.028]	[0.027]
Internet penetration	0.022	0.009	0.004	-0.013
	[0.017]	[0.017]	[0.017]	[0.017]
Google news (ln)	-0.089	0.051	0.039	0.179
	[0.123]	[0.124]	[0.123]	[0.123]
Twitter activity (ln)	0.596***	0.704***	0.721***	0.885***
	[0.094]	[0.095]	[0.094]	[0.096]
Google News sentiment	14.591***	16.863***	14.231***	9.768*
	[4.244]	[4.224]	[4.234]	[4.232]
Twitter sentiment	-1.540†	-1.494†	-1.402†	-1.171
	[0.855]	[0.847]	[0.842]	[0.831]
Hacks in any country value (ln)	-0.025	-0.043†	-0.072**	-0.058*
	[0.025]	[0.025]	[0.025]	[0.025]
Protecting minority investors	-0.040	-0.039	-0.060	-0.006
	[0.052]	[0.052]	[0.052]	[0.052]
Pre ban slope			0.675***	0.588***
			[0.147]	[0.145]
China/South Korea ban		-3.673***	-1.849*	0.185
		[0.668]	[0.773]	[0.824]
Post ban slope				-0.608***
				[0.093]
Constant	-9.712	-17.174	-2.068	-21.896
	[14.358]	[14.284]	[14.564]	[14.682]
Observations (Countries)	1615 (108)	1615 (108)	1615 (108)	1615 (108)
R-squared	0.278	0.292	0.302	0.322

All models fit a panel linear regression (xtreg). This is appropriate considering that the dependent variable is continuous and, after log transformation, normally distributed. We include country fixed effects to account for unobserved heterogeneity. All variables are lagged by one period.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ and † $p < 0.10$ (two tailed tests).