Cryptocurrency Listings on Cryptocurrency Exchanges

Jiasun Li
George Mason University
Jli29@gmu.edu

Mei Luo
Tsinghua University
luomei@sem.tsinghua.edu.cn

Muzhi Wang
Central University of Finance and Economics
wangmzh@cufe.edu.cn

Zhe Wei
Shenzhen University
weizh@szu.edu.cn

Abstract

Despite extensive studies on the secondary market trading of cryptocurrencies, few studies have looked into their listings onto exchanges. This paper thus first presents a case study comparing cryptocurrency listings on the largest and more regulated U.S. exchange, Coinbase, and the largest but less regulated global exchange, Binance. Regarding listing performance, while cryptocurrency listings on both exchanges see significantly positive short-term returns, the more regulated Coinbase sees significantly higher listing returns than the less regulated Binance. Regarding listing choices, while both exchanges tend to list cryptocurrencies with more GitHub development activities, conflicts of interests arise when exchanges list cryptocurrencies that their venture capital arms have previously invested in. Specifically, we find the less regulated Binance more likely to list its self-invested coins with inferior fundamentals, and the apparent agency friction does not seem to be corrected by market forces. To obtain external validity of the lessons learned from the top two exchanges, we further construct an exchange regulation index on a larger sample of 80 qualified exchanges, and confirm the relation between stricter exchange regulations and higher short-term listing returns, controlling for cryptocurrency and exchange attributes.

Key words: cryptocurrency; exchanges; listing; regulation

JEL classification: M48. M41. G10. G18

1. Introduction

Ever since Satoshi Nakamoto first published the Bitcoin white paper in 2008, numerous cryptocurrencies and tokens (cryptocurrencies hereafter) have emerged.[1] Along with the growth, a large number of cryptocurrencies exchanges have also risen to facilitate trading either between different cryptocurrencies or between crypto and fiat currencies . By the end of 2021, there are about 8,800 different cryptocurrencies traded on 309 crypto exchanges. Similar to traditional securities exchanges, the size of these exchanges varies widely. Over years of development, a handful of exchanges have become dominant in the industry, such as Binance internationally and Coinbase in the United States. Such growth has also led to heated debate about whether, and if so, how crypto exchanges should be regulated.[2]

listingnsive research has been devoted to secondary market trading of cryptocurrencies *listed* on exchanges, ranging from arbitrage between exchanges (Makarov and Schoar 2020), clientele effects (Shams 2020), fake volume (Cong, Li, Tang and Yang 2020; Aloosh and Li 2020; Amiram, Lyandres, and Rabetti 2020), factor structures (Li and Yi 2019; Liu and Tsyvinski 2020; Cong, Karolyi, Tang and Zhao 2022) etc., less is known about the *listing* of cryptocurrencies onto exchanges. What are the performances associated with cryptocurrency listings? How does such performance vary across major exchanges? Do listed cryptocurrencies

[1] Cryptocurrencies typically refer to native assets on a standalone blockchain, such as Bitcoin, Bitcoin Cash, Ethereum, Litecoin, Polkadot, Monero, Filecoin, etc.; Token typically refer to smart contract generated assets that typically live on another blockchain, such as Dai (MakerDAO), Uni (Uniswap), BAT, etc. living on the Ethereum blockchain. In this paper, for ease of exposition, we use cryptocurrencies to denote both types of assets.

[2] Most recently, in March 2022, the Biden administration issued an executive order requiring a coordinated effort from multiple government agencies over the regulatory framework for crypto assets, including the regulation of crypto exchanges. Historically, the New York State Department of Financial Services (NYSDFS) issued the BitLicense over all exchanges operating in New York or serving New York residents. While some exchanges embrace such regulations, others choose to outright leave the New York market.

have better fundamentals than non-listed ones? How does potential agency frictions and conflicts or interest affect exchange's listing decisions and cryptocurrencies' listing performances? This paper provides a formal analysis into these related questions.

Specifically, in this paper, we investigate the listing performances as well as listing decisions on two leading cryptocurrency exchanges: Binance and Coinbase. The two exchanges are chosen as they are the largest ones in respectively categories: Coinbase, founded by Brian Armstrong and Fred Ehrsam in the United States, is the dominant exchange in the U.S. market. It operates under U.S. regulations and allows users to trade fiat US dollars with cryptocurrencies. Binance, founded by Changpeng Zhao (CZ) originally in Asia, is the largest crypto exchange worldwide. However, it does not comply with U.S. regulations (indeed, US residents are barred from accessing it),[3] and only allows trading between cryptocurrencies but not with fiat currencies.[4] We thus analyze and compare the listing performances and listing decisions on these two representative exchanges with distinct regulatory compliance levels.

Before summarizing our empirical results, we highlight that although it is natural to relate the listing of cryptocurrencies with the IPO of stocks, and to certain degrees the two do share many similarities, there are several major institutional details that differentiate them. First, cryptocurrency exchanges themselves decide which coin gets listed, while regulatory agencies like the SEC that are unaffiliated with stock exchanges approve which company can issue stocks. Second, unlike an IPO which typically involves the creation of new shares, listing of cryptocurrencies typically does not create new units (in this sense, the listing of cryptocurrencies is more akin to the less common "direct listings"). Third, while an IPO

[3] Even though there is a separate entity known as Binance.US that operates independently from Binance.
[4] Makarov and Schoar (2020) denote Binance as a non-KYC exchange.

typically involves a deliberate choice of the "offer price", cryptocurrency listings typically do not feature such choices and associated share allocation (Rock 1986; Benveniste and Spindt 1989). Therefore, it is not obvious ex ante how cryptocurrency listing performances and listing decisions would look like. Our paper thus aims to shed light on these emerging market practices.

Regarding listing performances, we find that cryptocurrencies listed on Coinbase and Binance both have significantly positive returns on their listing announcement day, and cryptocurrencies listed on the more regulated Coinbase have a significantly higher return premium over those listed on Binance. For example, the average first day returns around listing announcement on Coinbase is 32.8%, and that on Binance is 22.7%. While these findings appear similar to well-known results on IPO underpricing in the stock market, due to the differences in institutional details mentioned above, they cannot be explained by the well-known costly signaling or share allocation theories developed for IPO pricing. An alternative explanation is that listing of cryptocurrencies, especially on major crypto exchanges, significantly boosts the liquidity of the cryptocurrency. However, since the listed coins on Coinbase and Binance often have been already trading on smaller exchanges, the liquidity channel alone does not seem to fully explain the listing performance. Indeed, if the liquidity boosting channel is the main force behind our result, we should expect to see a higher listing return on Binance, which features higher volumes and reaches a larger base of investors. Therefore, the significantly positive listing performances are most consistent with a certification effect, that is, investors perceive a cryptocurrency's listing as an endorsement of the coin's fundamentals, and thus bidding up its price.

To confirm the "certification effect", we further analyze the exchanges' listing decisions.

First, we confirm that both Coinbase and Binance are selective in their listing decisions: As we compare the fundamentals of listed cryptocurrencies versus non-listed ones, we find that cryptocurrencies chosen to be listed indeed feature significantly more active development and higher community awareness. Furthermore, consistent with both the "certification effect" and the significantly higher listing performance on Coinbase than Binance, we also confirm that Coinbase follows an even more selective listing policy.

Since exchanges have full discretions over what cryptocurrencies to list, we also investigate potential conflicts of interest within exchanges' listing decisions: Since both Binance and Coinbase have significant venture capital (VC) arms that invest in early-stage crypto projects, it is natural to suspect that the exchanges may favor its only investment and favorably list these assets. Such agency frictions may also be more salient on exchange that face less regulation. Following this idea, we compare both the fundamentals and listing performances of listed cryptocurrencies that have received previous VC fundings from the listing exchange versus ones that have not. We find that although cryptocurrencies listed on the more regulated Coinbase do not have significant differences between self-invested and non-self-invested subsamples, those listed on Binance do have. Specifically, listed cryptocurrencies that have previously been invested by Binance tend to have lower technology development activities than those who have not been previously invested. On the other hand, we do not find significant differences in listing returns between self-invested and non-self-invested groups for either Coinbase sample or Binance sample. The evidence suggests that as exchanges both invest in early stage cryptocurrencies and make listing decisions, the potential conflict of interest leads to less fundamentally sound coins being listed on less regulated exchanges, but the market does

not seem to be aware of such differences, justifying further regulatory involvement.

In the final part of the paper, we leverage what we have learned from Coinbase and Binance regarding listing performances and their interactions with the regulatory environment within which the exchanges respectively operate, we further extend our sample to all qualified crypto exchanges, construct a regulation index to capture the regulation environment each crypto exchange operates in, and test the relation between cryptocurrency listing performances and exchange regulation exposures. Specifically, the regulation index takes into account four dimensions, including 1) the listed status of the exchanges themselves (under stringent securities supervision), 2) financial licenses granted by local governments, 3) the general environment (such as investor protection, legal origin, and financial openness) of the country where the exchange is headquartered, and 4) status of non-BVI incorporation, given that BVI-areas (e.g. British Virgin Islands, Seychelles, Republic of Lithuania, Gibraltar, Dubai, South America, and The United Arab Emirates) allow entities with flexible organizational structure and limited financial reporting requirements. Results from a multivariate regression confirm that the stricter regulations an exchange faces the higher short-term listing returns are, after controlling for cryptocurrency and month fixed effects as well as other exchange-level attributes such as exchange sizes in terms of the number of listed cryptocurrencies.

Our paper contributes to a growing literature on the trading market of cryptocurrencies. Previous studies such as Makarov and Schoar (2020), Choi, Lehar, and Stauffer (2020), and Yu and Zhang (2021) document widespread arbitrage opportunities across exchanges. Shams (2020) document significant return clientele effects across exchanges. Cong, Li, Tang, and Yang (2021), and Amiram, Lyandres, and Rabetti (2020) statistically infer fake volume on crypto exchanges,

with direct evidence provide by Aloosh and Li (2020). Prior studies (e.g., Li and Yi 2019; Liu and Tsyvinski 2020; Cong, Karolyi, Tang and Zhao 2022) document the factor structures within cryptocurrency returns. Since our focus is on the more dominant centralized exchanges, we leave aside and complement studies on an emerging literature on smart contract based decentralized exchanges (Lehar and Parlour 2021; Capponi and Jia 2021; Aoyogi and Ito 2021). Our results also relate to a large literature on IPO underpricing. In a survey article, Lowry, Michaely, and Volkova (2017) document a 17.4% return from buying an IPO at the offer price and selling at the end of the first day. Rock's (1986) explains this finding by assuming that some investors have better information than others, so that IPO has to be underpriced in order to attract worse informed investors to overcome their winner's curse. Benveniste and Spindt's (1989) argue that shares are underpriced to incentivize investors' disclosure of their private information. Both explanations rely on an underwriting strategically choose the offer price, a feature that differs from the market of cryptocurrencies listing as we study in the paper.

The rest of the paper is organized as follows: Section 2 provides an overview of the institutional details of crypto exchanges. Section 3 presents our main findings from the comparison case of Coinbase and Binance, regarding the performance of cryptocurrency listings, exchanges' listing choices by comparing the fundamentals of listed and the rest of the cryptocurrency universe, and potential agency frictions associated with exchanges listing cryptocurrencies that their VC arms have previously invested in. Section 4 constructs a regulation index for all qualified exchanges and further evaluate the relation between exchange regulations and cryptocurrency listing performances. Section 5 then concludes.

2. **Overview of Crypto Exchanges**

Cryptocurrency exchanges emerge soon after the first cryptocurrency, Bitcoin, was created circa 2008-2009 as a digital payment system. The now defunct Mt.Gox was widely credited as the first, and for a long time, the only crypto exchange. It operated under little regulatory supervision and eventually collapsed in early 2014 due to suspected hack/embezzlement of customer funds. Early exchanges like Mt.Gox serve Bitcoin only, and play important roles in the Bitcoin ecosystem. This is because although Bitcoin itself is a closed system, so that anyone with bitcoin can freely pay others without the involvement of any centralized intermediary, for those with fiat currencies (e.g. US dollar) and would like to acquire bitcoins, cryptocurrency exchanges provide a venue where users can deposit fiat currency, exchange for bitcoin, and then withdraw bitcoin. The reverse also works for those (e.g., bitcoin miners) who would like to exchange bitcoin for fiat.

With the rise of many other cryptocurrencies other than bitcoin (often-known as altcoins), crypto exchanges now play an even more important role to allow users easily convert not only between bitcoin and fiat but also among various different cryptocurrencies.[6] Over years of industry evolution, Binance and Coinbase stand out as the largest exchanges internationally and within the US both in terms of trading volume and importance.[7] The two exchanges will also be the focus of our paper (except for in Section 4,), both in terms of illustrating industry practices and comparing more versus less regulated exchanges.

[6] To take Bitcoin as an example, Makarov and Schoar (2021) shows that around the end of 2020 more than 75% of real Bitcoin trading volume involves exchanges.

[7] Studies have proposed alternative exchange ranking measures that are less subject to manipulation than trading volume. For example, Makarov and Schoar (2021) have ranked the eigenvalue centrality of exchanges using on-chain transaction flows and confirm Binance and Coinbase as the top two exchanges.

While different exchanges may have slightly different listing procedures, the processes are typically quite similar. Specifically, an exchange first decides on which coin to get listed, then makes a public announcement of the listing decision, and finally the listed coin starts trading on the exchange typically the next day. Unlike the listing of stocks, which typically involves a firm creating new shares and an underwriter deciding on an "offer price", the listing of cryptocurrencies is much simpler. Specifically, no new coins are created, and no offering price needs to be decided. Indeed, for large exchanges such as Coinbase or Binance, their newly listed coins are often already trading on smaller exchanges. This feature differentiates coin listing from the new coin creation process, such as the case with Bitcoin, or other new coin creation events known as initial coin offering (ICO) or token sales in general.[8]

Figure 1 illustrates the trend of crypto listings on Coinbase and Binance over time. For every month in the sample period between 2017 and 2021, we plot the number of crypto listing events and the total market cap of listed assets on the announcement date on Coinbase, Binance, and the two exchanges together. Crypto listing activities tend to be pro-cyclical, i.e., more listings during the crypto bull market such as toward the end of year 2017 and the year of 2021. This pro-cyclical pattern is more pronounced on Binance, which has been following a more accommodative listing strategy, but also shows up saliently on Coinbase during the 2021 bull market, which begins to have a more accommodative listing strategy in 2021.

[8] For a review on the initial coin offering process, see e.g., Li and Mann 2021.

3. The Case of Coinbase and Binance

3.1 Sample and Data

Table 1 summarizes our sample selection process. Our sample contains all cryptocurrency listings on Coinbase and Binance from 2017 to 2021. Panel A shows that there are in total 135 listed cryptocurrencies on Coinbase by the end of 2021, out of which 9 are stable coins (whose prices are designed to remain constant with small deviations), 4 are wrapped coins (assets built on one blockchain ecosystem to replicate the performance of cryptocurrencies on a different blockchain ecosystem, for example, Wrapped BTC on Ethereum is an Ethereum-native token that carries the value of one bitcoin) and 4 are forks (which does not represent the exchange's deliberate listing choice, for example, Bitcoin forks into Bitcoin Core and Bitcoin Cash, and the latter further forks into BCH and BSV). Furthermore, three cryptocurrencies (Bitcoin, Ethereum and Litecoin) have been listed before 2017, before Binance started operation. Finally, there are three assets that do not have available trade data on other smaller exchanges when listed on Coinbase. Removing these exceptions leaves us with 112 listing events on Coinbase. Similarly, there are in total 366 listed cryptocurrencies on Binance by the end of 2021, out of which 17 are stable coins, 3 are wrapped coins, 7 are forks, and 6 are leveraged coins (whose returns are just multipliers of other underlying coins). Furthermore, 33 assets do not have available trade data elsewhere when listed on Binance. Removing these exceptions leaves us with 300 listing events on Binance. The number of coin listings has generally been increasing on Coinbase and taking a U-turn on Binance, largely in line with the overall performance of the crypto market. Panel B presents the evolution of the number of token listings over time across

both exchanges. For cryptocurrency returns, we use data from Coinmarketcap.com, which provides daily price dynamics of cryptocurrencies, sourced from a variety of exchanges.

<Insert Table 1>

Table 2 provides summary statistics of our listing samples. Alongside listing returns measured in different windows, we also include two cryptocurrency attributes: (1) *Daybeforelist*, i.e. the numbers of days it takes for a cryptocurrency to be listed on either Coinbase or Binance since the first day when trading data becomes available on CoinMarketCap. This measure is available because in most cases trading have already been taking place on other smaller exchanges before they get listed on Coinbase or Binance (and we discard the exceptions in our sample); (2) *MarketCap*, the market capitalization of a cryptocurrency on its listing announcement day. Within the Coinbase sample as shown in Panel A, on average price data become available about 600 days before being listed on Coinbase, the average market cap on listing announcement day is $1,345 million, and the average listing day return is 33%. Within the Binance sample as reported in Panel B, on average price data become available about 284 days before being listed on Binance, the average market cap on listing announcement day is $503 million, and the average listing day return is 26%. Overall, the results show that Binance is more aggressive (i.e., less selective) than Coinbase in their listing decisions – it lists much earlier and at much smaller market cap. Table 2 also provides summary information on the cumulative distributions of returns around listing events. Short-term listing returns are positive across different time windows although their distributions tend to be skewed.

<Insert Table 2>

3.2 Cryptocurrency Listing Performances

Table 3 presents the cumulative returns surrounding Coinbase and Binance listing events. Unlike in Table 2 where we focus on distributions, here we present formally statistical tests of whether the cumulative returns are positive, as well as the difference between Coinbase and Binance listing returns.

Panel A focuses on the post-listing returns. Day 0 is defined as the day when Coinbase or Binance formally announce their listing decisions. We find significant first day announcement returns of 32.8% and 22.7% for Coinbase and Binance listings, respectively. In comparison, the average returns on the day prior to the listing announcement are 3.3% and 6%, respectively. All return numbers are significantly different from zero. Given the skewness of the returns, we also investigate the median numbers. Median returns are 18.4% and 10.1% and both are significantly positive.

The first day listing returns are persistent. As Panel A further shows, the day 0 returns do not revert in longer periods, ranging from 5, 10, 30, and 180 days.[11] Panel A also shows significant return premium on Coinbase over Binance. This could be due to the more conservative listing selection by Coinbase than Binance. The premium, however, subsides as time passes following the listing announcement day.

Panel B shows the returns prior to listings. We can obtain the pre-listing trading price because coins are already trading on smaller exchanges or over the counter before being listed on Coinbase and Binance, so that their return information is readily available on data

[11] That said, our study focuses on short-term returns because there is no clear rule on how long-term cryptocurrency return benchmarks should be chosen to adjust for risks and overall crypto market performance.

aggregators such as CoinMarketCap. The pre-listing day returns also tend to be positive, but they are much smaller in magnitude compared to the post-listing day returns.

<Insert Table 3>

Table 4 breaks down the returns around listing announcements in different years to show the trends over time. Listing returns tend to be cyclical. For example, in the Binance sample, the average listing return is insignificant in 2019 (which is the year of the "crypto winter") but significantly positive for other years. On the other hand, for Coinbase listings, the average listing return is significantly positive in all of the 2017-2019, 2020, and 2021 periods, but lower during 2017-2019 (we group year 2017-2019 together for the Coinbase sample to obtain adequate sample size). Panel C also breaks down the return differences between Coinbase and Binance. Overall, the listing return premium of Coinbase over Binance mostly happens in the years 2020 and 2021.

<Insert Table 4>

To further separate the listing performances on Coinbase and Binance, Table 5 decomposes our sample into cross-listed and non-cross-listed samples. We label a listing as "cross-listed" if it starts trading on both Binance and Coinbase at some point during our sample. There are in total 88 cross-listed samples. Among Coinbase listings, the cross-listed samples have significantly lower listing returns than non-cross listed ones as shown in Panel A, while cross-listed coins do not see significantly different listing returns than non-cross-listed ones on Binance as shown in Panel B. Combining both results, we have that cross-listed samples tend to have lower announcement date returns than non-cross listed ones across all Coinbase and Binance listings.

<Insert Table 5>

Table 6 further dives into the listing return premium of Coinbase over Binance separately for cross-listed and non-cross-listed samples. Panel A of Table 6 shows that the return premiums exist for both cross-listed and non-cross-listed samples, with more significant and higher premium for non-cross-listed samples. This finding is consistent with Table 5 that listing return premium will be more salient if the coin only lists on one exchange. Within the cross-listed sample, Panel B of Table 6 further decomposes the cross-listed sample into ones in which Binance moves first versus ones in which Coinbase moves first. The results reveal that the return premium is stronger among cross-listings in which Coinbase moves first. Overall, the results show that listing return effect will be subsumed if the same coin has already been listed on the other exchange, especially if listed by Coinbase first.

<Insert Table 6>

3.3 Cryptocurrency Listing and Fundamentals

The listing returns documented above is consistent with a "certification" story in which exchange's listing serves an endorsement of a coin's fundamentals. To support this hypothesis, we compare the fundamentals of listed coins and non-listed ones. We gauge the fundamentals of a cryptocurrency by investigating the online code repositories GitHub, where blockchain ventures as well as the community voluntarily disclose the technical source code and updated code revisions. Specifically, we retrieve relevant information about a cryptocurrency's development and community activities from GitHub's API. We then use the following variables to measure a coin's technology advancement and development activeness: (1) *Coin*: a dummy

variable indicating whether the listed crypto is a coin that has its own underlying blockchain, or a token if it "lives" on existing blockchains; (2) *GitHub*: a dummy variable indicating whether a listed crypto has a GitHub repo; (3) *Commits*: the natural logarithm of one plus the number of revisions to a listed cryptocurrency's codebase within the GitHub repository; (4) *Stars*: the natural logarithm of one plus the number of "likes" received by the listed cryptocurrency's GitHub repository; and (5) *Issues*: the natural logarithm of one plus the number of "questions" discussed in the repository.

Table 7 presents the comparison outcomes. In Pane A of Table 7, we find that listed cryptocurrencies are more likely to be coins with independent blockchains rather than tokens living on another blockchain. Since it takes a lot more technical sophistication to develop a new chain than just deploying a token (which can be easily done by following certain smart contract templates), this finding suggests that listed coins tend to be technologically more sophisticated. We also find that listed cryptocurrencies are more likely to have GitHub websites, feature more commits, likes, and questions discussed in the GitHub repository. Overall, the evidence suggests that listed coins tend to have more active technological developments and community engagement than non-listed ones.

To lend further support to the validity of our measurement of fundamentals used in Panel A, Panel B of Table 7 further takes advantages of a unique institutional detail on Coinbase. For years, Coinbase has followed the practice of first announcing a short-list of cryptocurrencies it intends to research about and then deciding on whether to list or not several months later. Some of the researched coins, but not all of them, may then be listed on Coinbase later. Given that all these cryptocurrencies must have gone through some prescreening before entering the publicly

announced shortlist, we should expect these cryptocurrencies to demonstrate relatively more homogenous fundamentals. Consistently, as we compare the fundamentals of Coinbase-listed cryptocurrencies with those Coinbase-considered ones, we indeed find that the listed ones show no significant difference with those considered but not listed, except that the former are more likely to be tokens living on another blockchain rather than coins with independent blockchains.

<Insert Table 7>

3.4 Potential Agency Frictions

As new types of financial intermediaries, cryptocurrency exchanges operate under significantly different regulatory environment than traditional security exchanges. While AML/KYC requirements have been developing for crypto exchanges in developed countries, still many regulatory aspects have not received much regulatory attention. For example, it is quite common for crypto exchanges to control affiliated venture arms that invest in early-stage crypto projects (as is the case with both Coinbase and Binance). It is then natural to suspect a potential conflict of interest: To the extent that a coin's listing may be viewed as an endorsement, crypto exchanges then have incentives to favor the coins it has invested itself in listing decision or may even list self-invested coins prematurely. We thus further divide and compare subsamples in our data depending on whether they have received previous fundings from either Coinbase's or Binance's VC arms.

Table 8 summarizes the incurrence of exchange listings that have also been invested by the exchange itself. Among the total 328 cryptocurrencies ever listed by either exchange, 28 were invested by Coinbase, and 19 of them eventually got listed by Coinbase, accounting for

17% of 112 Coinbase listed cryptocurrencies. On the other hand, 44 were invested by Binance, and 42 of them eventually got listed by Binance, representing 14% of 300 Binance listed cryptocurrencies. These results demonstrate that both Coinbase and Binance list a sizable portion of cryptocurrencies from their own invested portfolios.

<Insert Table 8>

Table 9 examines whether the cryptocurrencies invested by exchanges (Coinbase or Binance) perform differently from those that were not invested by exchanges. Panel A presents whether Coinbase-invested cryptos exhibit higher fundamentals compared to non-invested cryptos within Coinbase listed sample. Panel B presents the corresponding results to Panel A for Binance sample. Panel C presents the differences in listing performances across Coinbase invested and non-invested cryptos within the Coinbase listed sample. Panel D then presents the corresponding results to Panel C for the Binance sample.

We find that among cryptocurrencies listed on Coinbase, whether or not Coinbase has invested in them earlier is not significantly associated with its underlying technology development activities, which indicates that potential conflict of interest does not appear to influence Coinbase's listing decisions. The story, however, paints a different picture for the less regulated Binance. Indeed, we find that among cryptocurrencies listed on Binance, whether or not Binance has invested in them earlier is significantly associated with less sophisticated development activities. This observation indicates that potential conflict of interest does influence the listing decisions of Binance, the less regulated crypto exchange.

Table 9 also investigates the listing performance differences between self-invested and non-self-invested listings on both exchanges. We find that neither the Coinbase listings nor the

Binance listings see significant differences in listing returns between self-invested and non-self-invested coins. This fact is concerning, especially for the Binance sample, in that investors do not seem to be aware of the potential conflict of interest in exchanges' listing decisions. The result shows that absent regulatory involvements, the market forces do not seem to work perfectly.

<Insert Table 9>

4. General Examination of Exchange Regulations and Crypto Listings

In the previous section, we focus on Coinbase and Binance only. We believe that the comparison between the two leading exchanges most familiar to investors can best inform us about how cryptocurrency listings operate. To further investigate how the lessons learned from the two leading exchanges generalize to other smaller exchanges with various specific exchange-level attributes, we further expand our study to all qualified crypto exchanges. Inspired by the fact that the more-regulated Coinbase sees significantly higher listing returns on the less-regulated Binance, we test the relation between cryptocurrency listing performance and exchange regulations among all qualified crypto exchanges in a multivariate regression specification, controlling for crypto characteristics, crypto market fluctuation and other exchange-level attributes.

4.1 Model Specifications

First of all, to assess the impact of exchanges' characteristics (excluding their the regulation environment they live in) on crypto assets' listing return, we employ the following model

(Equation 1). The dependent variable, denoted as CR_{ijt}, signifies the listing date raw return for crypto asset i on exchange j in month t.

$$CR_{ijt} = \alpha + \omega_i + \gamma_t + \beta_1' Exchange\_Character_j + \beta_2 NUM_{ijt} + \varepsilon_{ijt} \quad (1)$$

In Model (1), we explore three exchange characteristics. The first, *TOP*, is a dummy variable taking the value of 1 if the exchange is among the top 12 exchanges (identified by the number of listed crypto assets) and 0 otherwise. Exchanges with a higher number of listed crypto assets are presumed to have greater liquidity and tend to be perceived as more reputable among investors. The second character, *EXT*, is a dummy variable taking the value of 1 if the exchange has issued a tradable crypto asset and 0 otherwise. Exchanges issuing crypto assets are assumed to possess superior techniques and greater transparency in the market. The third characteristic, *DEX*, is a dummy variable taking the value of 1 if the exchange is decentralized. We make no preference between *DEX* and *CEX*. The listing return may vary with the number of exchanges that the crypto asset has been listed. To mitigate the impact of the listing order, *NUM*, the natural log of one plus the number of exchanges where the crypto asset is listed, is included in the model. Additionally, we control for crypto fixed effects (ω_i) and month fixed effects (γ_t) to account for the crypto asset's fundamentals and market effects.

Next, we investigate the influence of the regulation level an exchange faces on crypto assets' listing return in Model (2).

$$CR_{ijt} = \alpha + \omega_i + \gamma_t + \beta_1 Regualtion_j + \beta_2 NUM_{ijt} + \varepsilon_{ijt}, \quad (2)$$

where the regulation levels (*Regulation*) is assessed through four different measures:

1. *Listed:* A dummy variable, taking the value of 1 if any legal entity associated with the exchange is listed on a stock market, and 0 otherwise. A publicly listed exchange presumably

have undergone a more rigorous auditing process, and has to operate under more stringent security regulations (e.g., disclosure requirement).

2. *Licensed*: A dummy variable, taking the value of 1 if the legal entity has obtained required financial licenses from the local government(s) it operates in. Similar to the rationale behind *Listed*, an exchange with *Licensed* equaling 1 is presumably subject to more rigorous regulations.

3. *Country_Reg*: This variable is scored based on the investor protection, legal origin, and financial openness of the country where the exchange is headquartered, ranging from 0 to 3. A higher score for *Country_Reg* indicates stricter regulation.

4. *BVI*: A dummy variable, taking the value of 1 if the exchange is headquartered in areas such as the British Virgin Islands, Seychelles, Republic of Lithuania, Gibraltar, Dubai, South America, and The United Arab Emirates, and 0 otherwise. Since BVI companies are known for quick incorporation, flexible organizational structure, and minimal financial reporting requirements, being a BVI exchange is indicative of relatively looser regulations.

To concisely capture these various regulation-related dimensions, we also construct a simple index, *Exchange_Reg*, as the sum of *Listed*, *Licensed*, *Country_Reg*, and the negative value of *BVI* to represent the overall regulation level. A higher *Exchange_Reg* implies a stricter regulatory environment. Then in Model (3), we extend our investigation to explore the interaction between *Exchange_Reg* and Exchange characteristics, and see how exchange attributes and the regulation levels they face jointly affect their cryptocurrency listing performances.

$$CR_{ijt} = \alpha + \omega_i + \gamma_t + \beta_1 Exchange\_Reg_j + \beta_2^{'} Exchange\_Character_j +$$

$$\beta_3 \, Exchange\_Reg_j \times Exchange\_Character_j + \varepsilon_{ijt} \quad (3)$$

For reader's ease, all variable definitions will be further summarized in Appendix.

4.2 Sample and Data

We start from 12,511 crypto asset trading pairs from Kaiko, among which 5,859 of them can be successfully matched to the price data from CoinMarketCap. Since our primary focus is on assessing how exchange attributes and regulatory exposures influence listing performances, we exclude observations that lack sufficient exchange information, resulting in 5,596 remaining observations. To ensure adequate representation, we require each crypto asset to be listed on at least three exchanges, resulting in 4,590 observations. To separate the impact of the listing exchange on crypto asset listing return, we further exclude observations in which the same crypto asset was listed on multiple exchanges on the same day. Our final sample encompasses 649 unique crypto assets listed on 80 exchanges, totaling 4,181 observations, over a period from September 2014 to September 2022. Table 10 Panel A outlines the above-mentioned sample selection process.

Since about half (or more precisely 49.34%) of the 4,181 observations in our total sample come from the top 12 exchanges with the greatest number of listed crypto assets, Table 10 Panel B further provides an overview of the sample decomposition among these 12 exchanges. HitBTC has the largest number of listings with 229 "base crypto asset - USDT" trading pairs, constituting 5.48% of the total sample. Binance secures the second position with 5.36%, while Coinbase Pro holds the 11th position contributes to 3.06% the overall sample, consistent with its more selective listing behavior.

<Insert Table 10>

Table 11 presents summary statistics for all the variables of interest regarding exchange attributes, including both *CR* (listing return) and exchange characteristics in the all-qualified exchanges sample. In Panel A, the mean listing return for crypto assets is 2.9%, with a median of 0.4%, which is significantly lower than the level of listing returns reported in the Coinbase or Binance sample. Approximately 49.3% of the observations involve crypto assets listed on one of the top 12 exchanges (*TOP*). For 59.1% of the observations, crypto assets are listed on exchanges with tradable crypto assets (*EXT*), and 14.7% are listed on decentralized exchanges (*DEX*). On average, a crypto asset has listed on approximately 7 other exchanges (*NUM*).

Table 11 Panel B presents summary statistics for all the variables of interest regarding the levels of regulation these exchanges face. Since decentralized exchanges are purely smart contract-driven and function differently from centralized exchanges (CEX), they are excluded from this analysis. On average, 11% of the sample comprises crypto assets listed on exchanges with a legal entity listed on a stock market (*Listed*). In 83.2% of cases, crypto assets are listed on exchanges with the necessary licenses from local governments (*Licensed*). The average *Country_Reg* score is 1.165, indicating relatively weak investor protection. Additionally, 21.1% of the sample involves crypto assets listed on exchanges headquartered in *BVI* areas. The mean value (standard deviation) of our composed measure about the regulatory level of crypto exchanges (*Exchange_Reg*) is 1.897 (1.354). The next section will formally analyze the relationship between these regulatory measures and listing returns.

<Insert Table 11>

4.3 Empirical Results

Table 12 presents the regression results for Model (1). Columns (1) to (3) individually examine the impact of the three exchange characteristics on listing return. Notably, the only statistically significant result is observed for the variable *TOP* in Column (1). The coefficient is 0.018 and is significantly different from 0 at the 1% level. Columns (2) and (3) do not exhibit statistically significant coefficients for exchange characteristics *EXT* and *DEX*. Among the 3 columns, the coefficients for *NUM* are all negative and significant at the 1% level, indicating the more exchanges the crypto asset has been listed before, the smaller the listing returns. Table 4, Column (4) consolidates all three exchange characteristics in the analysis. The results align with those from the previous three columns, with the coefficient for *TOP* remaining positive and significant (0.018, $p < 0.01$).

<Insert Table 12>

Table 13 provides the regression results for Model (2). Columns (1) to (5) individually investigate the impact of exchange regulation level on listing return. Column (1) indicates that the coefficient for *Listed* is not statistically significant at the 10% level. In Column (2), the coefficient for *Licensed* is 0.026 ($p < 0.01$), suggesting a positive impact on the listing return. Furthermore, *Country_Reg* exhibits a statistically significant and positive effect on the listing return, with a coefficient of 0.008 and significance at the 5% level (Column 3). Column (4) suggests that being headquartered in *BVI* areas has a negative and significant effect ($p < 0.10$) on the listing return. Finally, the composite index, *Exchange_Reg*, is introduced in Column (5) and shows a positive relationship with the listing return. The coefficient is 0.006, and this result

is statistically significant at the 1% level. In summary, the regression results from Table 13 suggest that the listing return tends to be higher when the listing exchange operates under more stringent regulation.

<Insert Table 13>

Table 14 delves into the joint impact of *Exchange_Reg* and Exchange characteristics (excluding *DEX*) on listing performances. Columns (1) to (4) sequentially introduce various independent variables and control for their interactions. In Column (1), both *Exchange_Reg* and *TOP* are included as independent variables. The results indicate that both *Exchange_Reg* and *TOP* exhibit a positive and significant effect on listing return. Specifically, the coefficient for *Exchange_Reg* is 0.006 ($p < 0.05$), and for *TOP*, it is 0.023 ($p < 0.01$). Column (2) expands the model by adding *EXT* as an independent variable and *NUM* as a control variable. The results for *Exchange_Reg* and *TOP* remain consistent with those in Column (1). Notably, the coefficient for *EXT* is 0.015 and significant at the 10% level. The coefficient for *NUM* aligns with the findings in Table 4. Column (3) introduces the interaction term of *Exchange_Reg* and *TOP* based on Column (1). Interestingly, neither the coefficient of *Exchange_Reg* nor that of *TOP* is significant at more at the 10% level, and both got absorbed by their interaction terms. Indeed, the coefficient of the interaction term is positive (0.013) and significant at the 5% level. This finding suggests that the positive impact on listing returns enjoyed by large exchanges only manifests when the exchange is more regulated.

The last column of Table 14 includes *EXT*, *NUM*, and their interaction term with *Exchange_Reg* based on Column (3). The coefficient of *EXT* turns negative and is significant at the 10% level, indicating that exchanges issuing tradable crypto assets have a negative impact

on listing return in the absence of proper regulation. However, the coefficient of the interaction between *Exchange_Reg* and *EXT* is positive (0.026) and significant at the 1% level. The coefficient for *NUM* is consistent with prior findings, and the interaction term of *NUM* and *Exchange_Reg* is insignificant at the 10% level.

<Insert Table 14>

5. **Conclusion**

In this paper, we analyze the performance, selection, and potential agency frictions related to cryptocurrency listings on two leading exchanges, the U.S. regulated Coinbase and less regulated Binance operating outside of the U.S. We document significant listing returns on both exchanges, as well as significant listing return premiums on Coinbase over Binance. These significant returns are consistent with the exchange listings serving as "certificates" to the coin's value. In line with the conjecture, we find that listed coins have significantly more active technology development activities. Given increasing regulatory interest in crypto exchanges, we also investigate potential conflict of interest in cryptocurrency listings decisions. Specifically, we find that listings on the less regulated Binance tend to have lower fundamentals, even though the market does not seem to discern it as indicated by their similar listing day returns. Finally, we replicate the basic finding that listing return premiums can be explained by the tightness of crypto exchange regulations among all exchanges after controlling for crypto itself, month fixed effects and other exchange-level attributes. These findings point to potential values of appropriate and adequate regulations (e.g. the requirement of conflict-of-interest disclosures) for crypto exchanges and their investors.

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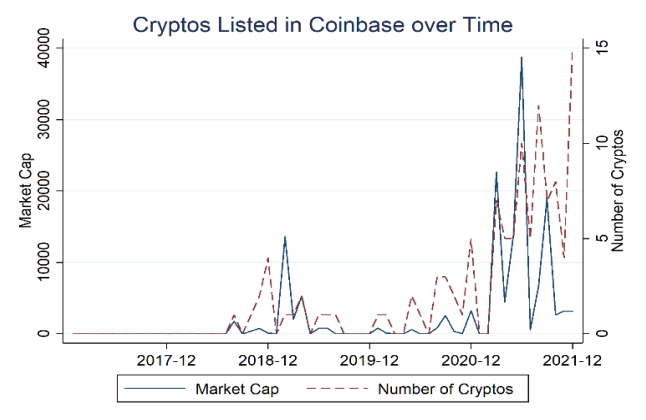
Appendix. Variable Definitions

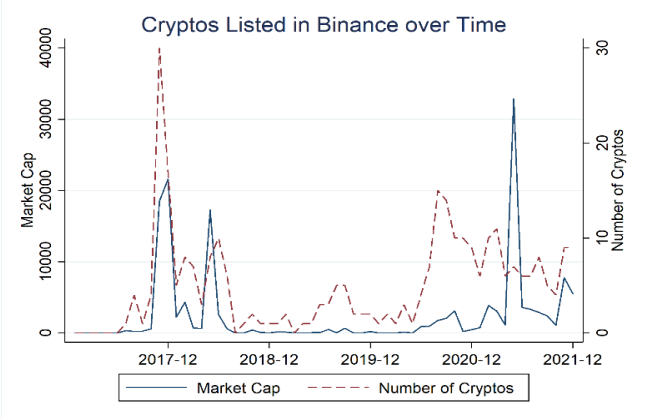
Variables	Definitions
Crypto-level attributes	
$CR_{[x, y]}$	Cumulated returns between x and y days relative to the listing (announcement) date of crypto on the Coinbase or Binance platform. For brevity, *CR* is the cumulative one-day return. Return is calculated as the daily close price minus the open price divided by the open price, and price data is obtained from https://coinmarketcap.com/
Daybeforelist	The days it takes for cryptos to list on Coinbase or Binance exchange since the day when it has trading data on Coinmarketcap.
MarketCap	The market capitalization on the crypto listing announcement day, is measured in million US dollars.
Coin	Dummy variable equals 1 if a crypto is a coin and 0 if a crypto is a token.
GitHub	Dummy variable equals 1 if a crypto has a GitHub link and 0 otherwise.
Commits	The natural logarithm of one plus the number of times the code has been revised.
Issues	The natural logarithm of one plus the number of "questions" discussed in the repository.
Stars	The natural logarithm of one plus the number of "likes" received by the repository.
Exchange-level attributes	
TOP	Dummy variable equals 1 if the exchange is among the 12 leading exchanges with the highest number of listed cryptocurrencies and 0 otherwise.
EXT	Dummy variable equals 1 if the exchange has issued a tradable crypto and 0 otherwise.
DEX	Dummy variable equals 1 if the exchange is decentralized and 0 otherwise.
NUM	The natural logarithm of one plus the number of exchanges where the crypto asset is listed.
Listed	Dummy variable equals 1 if the exchange is listed on any stock market and 0 otherwise.
Licensed	Dummy variable equals 1 if the exchange has acquired license from local government and 0 otherwise.
Country_Reg	Manually coded regulation level of the country on cryptocurrencies or the exchange from 0 to 3, with larger number representing stricter regulation.
BVI	Dummy variable equals 1 if the exchange headquartered in BVI area and 0 otherwise.
Exchange_Reg	A composed index indicating how strictly has the exchange been regulated. $Exchange\_Reg = Listed + Licensed + Country\_Reg - BVI$

FIGURE 1

Crypto Listing Trend

Figure 1 illustrates the trend of crypto listings in Coinbase and Binance over time from January of 2017 to December of 2021. We plot the number of crypto listing events in each month, and the sum of market capitalization (in $millions) of listed cryptos on the announcement date in each month on Coinbase, Binance, and the two exchanges together.





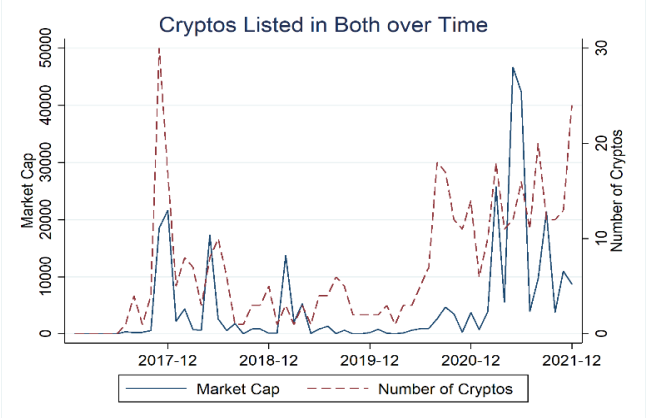


TABLE 1

Sample Selection and Sample Distribution

Table 1 reports how the sample observations (crypto listings in Coinbase and Binance) are selected and its distribution by year.

Panel A. Sample Selection of the Representative Case

Criteria	Coinbase Obs.	Binance Obs.
Cryptos listed on the crypto exchange until Dec. 2021	135	366
(Drop) Stablecoins (9 or 17), wrapped program (4 or 3), forks (4 or 7) in Coinbase or Binance, and leveraged tokens in Binance	(17)	(33)
(Drop) Cryptos that were listed before 2017 (e.g. Bitcoin, Ethereum, and Litecoin) in Coinbase	(3)	(0)
(Drop) Trade data is not available when listed on Coinbase	(3)	(33)
Final sample	112	300

Panel B. Sample Distribution of the Representative Case by Year

	Coinbase sample		Binance sample	
List Year	Obs.	%	Obs.	%
2017	0	0.00	57	19.00
2018	8	7.14	52	17.33
2019	7	6.25	27	9.00
2020	19	16.96	77	25.67
2021	78	69.64	87	29.00
Final sample	112	100.00	300	100.00

TABLE 2

Descriptive Statistics

Table 2 summarizes main variables for Coinbase (Binance) listed sample. All variables are defined in the Appendix.

Panel A. Crypto Listings in Coinbase

Variables	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Daysbeforelist	112	598.6	513.7	228.5	404.0	947.0
MarketCap	112	1345	3373	116.2	304.4	812.9
$CR_{[0]}$	112	0.328	0.470	0.061	0.184	0.388
$CR_{[0, 4]}$	112	0.422	0.681	0.015	0.204	0.490
$CR_{[0, 9]}$	112	0.393	0.710	-0.079	0.154	0.592
$CR_{[0, 29]}$	112	0.403	0.814	-0.094	0.204	0.642
$CR_{[0, 179]}$	85	0.837	1.078	0.086	0.710	1.429
$CR_{[-1]}$	108	0.033	0.146	-0.051	0.015	0.070
$CR_{[-5, -1]}$	107	0.119	0.312	-0.055	0.056	0.212
$CR_{[-10, -1]}$	106	0.215	0.425	-0.064	0.100	0.414
$CR_{[-30, -1]}$	104	0.395	0.681	-0.018	0.328	0.632

Panel B. Crypto Listings in Binance

Variables	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Daysbeforelist	300	284.3	394.1	23.00	134.5	350.0
MarketCap	300	503.0	1781	16.67	98.38	326.8
$CR_{[0]}$	300	0.227	0.493	-0.041	0.101	0.319
$CR_{[0, 4]}$	300	0.176	0.616	-0.162	0.058	0.319
$CR_{[0, 9]}$	300	0.164	0.667	-0.202	0.052	0.369
$CR_{[0, 29]}$	300	0.260	0.894	-0.315	0.073	0.692
$CR_{[0, 179]}$	278	0.892	1.617	-0.150	0.660	1.783
$CR_{[-1]}$	262	0.060	0.180	-0.047	0.020	0.091
$CR_{[-5, -1]}$	250	0.195	0.366	-0.015	0.116	0.296
$CR_{[-10, -1]}$	242	0.313	0.478	-0.013	0.223	0.484
$CR_{[-30, -1]}$	221	0.569	0.822	0.032	0.379	0.989

TABLE 3

Cumulated Returns around the Listing Date

Table 3 presents the cumulative raw returns for cryptos listed on Coinbase or Binance exchange around the announcement dates and the different listing effects between Coinbase and Binance in last two columns. Panel A presents the cumulative raw returns after the announcement of listing. Panel B presents the cumulative raw returns before the announcement date. Median test means Wilcoxon signed-rank test. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively.

Panel A. Cumulated Return post the Listing Date

	Coinbase Sample		Binance Sample		Difference	
	(1)	(2)	(3)	(4)	(5) = (1)-(3)	(6) = (2)-(4)
	Mean	Median	Mean	Median	Mean Diff.	Median Diff.
	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)
$CR_{[0]}$	0.328***	0.184***	0.227***	0.101***	0.101*	0.083***
	(7.383)	(8.479)	(7.971)	(7.808)	(1.880)	(3.296)
$CR_{[0, 4]}$	0.422***	0.204***	0.176***	0.058***	0.246***	0.146***
	(6.563)	(6.369)	(4.955)	(3.478)	(3.502)	(3.987)
$CR_{[0, 9]}$	0.393***	0.154***	0.164***	0.052***	0.229***	0.102***
	(5.856)	(5.141)	(4.261)	(2.926)	(3.045)	(3.045)
$CR_{[0, 29]}$	0.403***	0.204***	0.260***	0.073***	0.143	0.131*
	(5.239)	(4.613)	(5.043)	(3.673)	(1.476)	(1.889)
$CR_{[0, 179]}$	0.837***	0.710***	0.892***	0.660***	-0.055	0.050
	(7.156)	(6.071)	(9.193)	(8.039)	(-0.292)	(0.325)

Panel B. Cumulated Return before the Listing Date

	Coinbase sample		Binance sample		Difference	
	(1)	(2)	(3)	(4)	(5) = (1)-(3)	(6) = (2)-(4)
	Mean	Median	Mean	Median	Mean Diff.	Median Diff.
	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)
$CR_{[-1]}$	0.033***	0.015*	0.060***	0.020***	-0.027	-0.005
	(2.382)	(1.732)	(5.418)	(4.266)	(-1.372)	(-1.038)
$CR_{[-5, -1]}$	0.119***	0.056***	0.195***	0.116***	-0.076*	-0.060**
	(3.942)	(3.593)	(8.408)	(8.621)	(-1.868)	(-2.162)
$CR_{[-10, -1]}$	0.215***	0.100***	0.313***	0.223***	-0.099*	-0.123**
	(5.197)	(4.695)	(10.192)	(9.487)	(-1.831)	(-2.175)
$CR_{[-30, -1]}$	0.395***	0.328***	0.569***	0.379***	-0.174*	-0.051
	(5.913)	(5.591)	(10.281)	(9.266)	(-1.873)	(-1.441)

TABLE 4

Cumulated Returns around the Listing Date by Year

Table 4 reports the cumulative raw returns around the announcement date of listing on Coinbase or Binance exchange by year. Panel A presents the cumulative raw returns for cryptos listed on Coinbase around the announcement date by year. We group year 2017-2019 together because of the small sample size. Panel B presents the cumulative raw returns for cryptos listed on Binance around the announcement date by year. Panel C presents the different listing effects across Coinbase and Binance. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively.

Panel A. Coinbase Sample

	(1) Year 2017-2019 (obs. = 15) Mean (t-stat.)	(2) Year 2020 (obs. = 19) Mean (t-stat.)	(3) Year 2021 (obs. = 78) Mean (t-stat.)
$CR_{[0]}$	0.078***	0.355***	0.370***
	(3.601)	(3.252)	(6.524)
$CR_{[0, 4]}$	0.076	0.630***	0.439***
	(1.394)	(3.414)	(5.616)
$CR_{[0, 9]}$	0.028	0.634***	0.405***
	(0.449)	(3.613)	(4.864)
$CR_{[0, 29]}$	-0.064	0.557***	0.456***
	(-0.997)	(3.076)	(4.650)
$CR_{[0, 179]}$	-0.016	1.683***	0.772***
	(-0.092)	(9.126)	(5.238)
$CR_{[-1]}$	0.001	0.057**	0.035*
	(0.016)	(2.220)	(1.839)
$CR_{[-5, -1]}$	0.018	0.116	0.140***
	(0.392)	(1.562)	(3.638)
$CR_{[-10, -1]}$	0.088*	0.122	0.262***
	(1.810)	(1.246)	(4.908)
$CR_{[-30, -1]}$	-0.025	0.405**	0.480***
	(-0.176)	(2.138)	(6.212)

Panel B. Binance Sample

	(1) Year 2017 (obs. = 57) Mean (t-stat.)	(2) Year 2018 (obs. = 52) Mean (t-stat.)	(3) Year 2019 (obs. = 27) Mean (t-stat.)	(4) Year 2020 (obs. = 77) Mean (t-stat.)	(5) Year 2021 (obs. = 87) Mean (t-stat.)
$CR_{[0]}$	0.163***	0.287***	0.012	0.196***	0.327***
	(3.018)	(3.249)	(0.216)	(3.251)	(6.910)
$CR_{[0, 4]}$	0.191***	0.191*	-0.028	0.149*	0.245***
	(2.765)	(1.816)	(-0.416)	(1.836)	(4.212)
$CR_{[0, 9]}$	0.288***	0.148	-0.112	0.112	0.225***
	(3.559)	(1.379)	(-1.529)	(1.256)	(3.665)
$CR_{[0, 29]}$	0.893***	0.074	-0.255**	0.104	0.256***
	(6.697)	(0.624)	(-2.643)	(0.982)	(3.530)
$CR_{[0, 179]}$	1.672***	-0.506***	-0.265	1.817***	0.710***
	(7.663)	(-3.796)	(-1.500)	(9.909)	(5.615)
$CR_{[-1]}$	0.109***	0.051**	0.148**	0.035	0.033**
	(3.249)	(2.390)	(2.573)	(1.551)	(2.582)
$CR_{[-5, -1]}$	0.332***	0.097**	0.305***	0.199***	0.141***
	(4.984)	(2.232)	(3.309)	(3.880)	(4.358)
$CR_{[-10, -1]}$	0.510***	0.151**	0.379***	0.351***	0.248***
	(6.170)	(2.548)	(3.306)	(5.043)	(5.479)
$CR_{[-30, -1]}$	0.726***	0.194*	0.545***	0.635***	0.664***
	(5.333)	(1.706)	(3.854)	(6.112)	(6.244)

Panel C. Cumulated Return Difference between Exchanges around the Listing Date

Coinbase over Binance premium	Year 2017-2019 (obs. =151)		Year 2020 (obs. =96)		Year 2021 (obs. =165)	
	(1) Mean Diff. (t-stat.)	(2) Median Diff. (z-stat.)	(3) Mean Diff. (t-stat.)	(4) Median Diff. (z-stat.)	(5) Mean Diff. (t-stat.)	(6) Median Diff. (z-stat.)
$CR_{[0]}$	-0.103	-0.008	0.159	0.101*	0.043	0.013
	(-0.795)	(0.330)	(1.192)	(1.775)	(0.590)	(0.702)
$CR_{[0, 4]}$	-0.071	0.005	0.480**	0.246***	0.194**	0.051*
	(-0.454)	(0.311)	(2.555)	(3.150)	(2.015)	(1.831)
$CR_{[0, 9]}$	-0.127	-0.026	0.522**	0.317***	0.180*	-0.002
	(-0.745)	(-0.323)	(2.623)	(3.094)	(1.767)	(0.992)
$CR_{[0, 29]}$	-0.416	-0.168	0.453*	0.487**	0.200*	0.059
	(-1.620)	(-1.356)	(1.964)	(2.331)	(1.664)	(1.312)
$CR_{[0, 179]}$	-0.470	-0.110	-0.134	0.175	0.062	0.037
	(-1.092)	(-0.666)	(-0.350)	(0.143)	(0.322)	(0.003)
$CR_{[-1]}$	-0.093*	-0.019	0.022	0.053**	0.002	-0.020
	(-1.669)	(-1.495)	(0.491)	(1.975)	(0.075)	(-0.944)
$CR_{[-5, -1]}$	-0.214**	-0.096**	-0.083	-0.031	-0.001	-0.024
	(-2.044)	(-2.219)	(-0.807)	(-1.139)	(-0.015)	(-0.516)
$CR_{[-10, -1]}$	-0.254*	-0.155*	-0.229*	-0.240***	0.014	-0.052
	(-1.910)	(-1.801)	(-1.676)	(-2.659)	(0.201)	(-0.210)
$CR_{[-30, -1]}$	-0.485**	-0.322**	-0.230	-0.212	-0.184	-0.046
	(-2.320)	(-2.200)	(-1.099)	(-1.196)	(-1.391)	(-0.666)

TABLE 5

Listing Returns for Cross-listed and Non-cross-listed Samples

Table 5 Panel A presents the cumulative raw returns for cross-listed and non-cross-listed cryptos on Coinbase and the return differences between the two subsamples. Panel B similarly presents the cumulative raw returns for cross-listed and non-cross-listed cryptos on Binance and the return differences between the two subsamples. Median test means Wilcoxon signed-rank test. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively.

Panel A. Coinbase Sample

	Cross-listed (obs. =88)		Non-cross-listed (obs.=24)		Difference	
	(1) Mean. (t-stat.)	(2) Median. (z-stat.)	(3) Mean (t-stat.)	(4) Median. (z-stat.)	(5) = (1)-(3) Mean Diff. (t-stat.)	(6) = (2)-(4) Median Diff. (z-stat.)
$CR_{[0]}$	0.246***	0.139***	0.630***	0.365***	-0.384***	-0.226***
	(6.432)	(7.221)	(4.543)	(4.286)	(-3.739)	(-3.375)
$CR_{[0, 4]}$	0.355***	0.122***	0.670***	0.391***	-0.315**	-0.269**
	(5.495)	(5.076)	(3.743)	(3.829)	(-2.039)	(2.071)
$CR_{[0, 9]}$	0.321***	0.117***	0.657***	0.336***	-0.336**	-0.219
	(4.876)	(4.069)	(3.396)	(3.200)	(-2.091)	(1.638)
$CR_{[0, 29]}$	0.311***	0.104***	0.742***	0.417***	-0.431**	-0.313**
	(3.980)	(3.166)	(3.602)	(3.686)	(-2.348)	(-2.297)
$CR_{[0, 179]}$	0.745***	0.634***	1.454***	1.071***	-0.709	-0.437
	(6.330)	(5.320)	(3.595)	(2.934)	(-2.074)	(1.676)

Panel B. Binance Sample

	Cross-listed (obs. =88)		Non-Cross-listed (obs.=212)		Difference	
	(1) Mean. (t-stat.)	(2) Median. (z-stat.)	(3) Mean (t-stat.)	(4) Median. (z-stat.)	(5) = (1)-(3) Mean Diff. (t-stat.)	(6) = (2)-(4) Median Diff. (z-stat.)
$CR_{[0]}$	0.179***	0.085***	0.246***	0.115***	-0.067	-0.030
	(4.869)	(4.371)	(6.623)	(6.480)	(-1.072)	(-0.235)
$CR_{[0, 4]}$	0.126**	0.087**	0.197***	0.052***	-0.071	0.035
	(2.390)	(2.047)	(4.349)	(2.851)	(-0.913)	(-0.029)
$CR_{[0, 9]}$	0.083	0.023	0.197***	0.081***	-0.114	-0.058
	(1.494)	(1.040)	(4.015)	(2.843)	(-1.349)	(-0.851)
$CR_{[0, 29]}$	0.100	-0.075	0.327***	0.129***	-0.226**	-0.204**
	(1.146)	(0.191)	(5.194)	(4.114)	(-2.005)	(-2.180)
$CR_{[0, 179]}$	0.870***	0.543***	0.900***	0.699***	-0.030	-0.156
	(5.229)	(4.450)	(7.601)	(6.624)	(-0.137)	(-0.008)

TABLE 6
Listing Return Difference between Coinbase and Binance among the Cross-list and Non-cross-list Samples

Table 6 presents the listing return premiums of Coinbase over Binance separately for cross-listed and non-cross-listed samples and further decomposes the cross-listed sample into ones in which Binance moves first versus ones in which Coinbase moves first. Panel A presents the differences of listing effects across Coinbase and Binance separately for cross-listed and non-cross-listed sub-samples. Panel B presents the results further separating the cross listed sample by the order of listing. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively.

Panel A. Return Premium of Coinbase over Binance for Cross- and Non-cross- List Samples

Coinbase over Binance premium	Cross list sample (obs. =176) (1) Mean Diff. (t-stat.)	Non-cross list sample (obs.=236) (2) Mean Diff. (t-stat.)
$CR_{[0]}$	0.067	0.383***
	(1.254)	(3.193)
$CR_{[0, 4]}$	0.229***	0.473***
	(2.747)	(3.207)
$CR_{[0, 9]}$	0.237***	0.460***
	(2.748)	(2.878)
$CR_{[0, 29]}$	0.210*	0.415**
	(1.789)	(2.085)
$CR_{[0, 179]}$	-0.125	0.554
	(-0.608)	(1.078)

Panel B. Return Premium of Coinbase over Binance after Considering the Order of Listing in the Cross-List Sample

Coinbase over Binance premium	Binance first sample (obs. =120)		Coinbase first sample (obs. =56)	
	(1) Mean Diff. (t-stat.)	(2) Median Diff. (z-stat.)	(3) Mean Diff. (t-stat.)	(4) Median Diff. (z-stat.)
$CR_{[0]}$	0.043	0.068**	0.136	0.034
	(0.817)	(2.237)	(1.130)	(0.320)
$CR_{[0, 4]}$	0.167*	0.022*	0.384**	0.233
	(1.915)	(1.833)	(2.114)	(1.265)
$CR_{[0, 9]}$	0.143	0.033	0.459**	0.319*
	(1.515)	(1.434)	(2.560)	(1.939)
$CR_{[0, 29]}$	0.067	0.049	0.524**	0.405*
	(0.493)	(1.040)	(2.312)	(1.807)
$CR_{[0, 179]}$	-0.269	-0.056	0.243	0.134
	(-1.075)	(-0.637)	(0.678)	(1.093)

TABLE 7

Comparisons between Listed Cryptos and non-listed Cryptos

Table 7 presents the differences in technology development between listing cryptos and non-listing cryptos. Panel A presents the results for Coinbase and Binance listing cryptos versus non-listing cryptos. Panel B presents the results for Coinbase listing cryptos versus Coinbase considered but end up not-listed cryptos. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively. Due to crypto "*MCO*" is untracked when the collected GitHub data, the total observation in Panel A is 327 (= 328-1). Observation for *Commits, Stars, Issues* for Listed cryptos (Other cryptos) sample is 63 (1423) in Panel A. Observation for *Commits, Stars, Issues* for Coinbase-listed cryptos (Coinbase-considered cryptos) sample is 24 (10) in Panel B.

Panel A. Difference in Technology Development between Listed and non-listed Cryptos

Variables	Listed cryptos (obs. =327)		Non-listed cryptos (obs. =9650)		Difference between listed cryptos and non-listed cryptos	
	(1) Mean	(2) Median	(3) Mean	(4) Median	(5) = (1)-(3) Mean diff.	(6) = (2)-(4) Median diff.
					(t-stat.)	(z-stat.)
Coin	0.292	0.000	0.099	0.000	0.193***	0.000***
					(11.26)	(11.19)
GitHub	0.202	0.000	0.164	0.000	0.038*	0.000*
					(1.788)	(1.788)
Commits	7.203	7.845	3.423	2.485	3.780***	5.360***
					(10.93)	(9.255)
Stars	5.722	6.227	1.664	1.099	4.058***	5.128***
					(17.65)	(11.24)
Issues	3.449	3.497	0.582	0.000	2.867***	3.497***
					(18.86)	(12.61)

Panel B. Technology Comparisons between Coinbase- listed and -considered Cryptos

Variables	Coinbase-listed sample (obs. =112)		Coinbase-considered sample (obs. =30)		Difference between Coinbase listed and considered samples	
	(1) Mean (t-stat.)	(2) Median (z-stat.)	(3) Mean (t-stat.)	(4) Median (z-stat.)	(5) = (1)-(3) Mean diff. (t-stat.)	(6) = (2)-(4) Median diff. (z-stat.)
Coin	0.196	0.000	0.700	1.000	-0.504***	-1.000***
					(-5.919)	(-5.312)
GitHub	0.223	0.000	0.334	0.000	-0.110	0.000
					(-1.241)	(-1.239)
Commits	7.209	7.955	7.321	7.714	-0.112	0.241
					(-0.136)	(0.227)
Stars	6.248	7.013	6.337	6.710	-0.089	0.303
					(-0.107)	(0.151)
Issues	3.949	4.376	4.699	5.032	-0.750	-0.656
					(-1.028)	(-0.851)

TABLE 8

Crypto Exchange Self-Investment

Table 8 presents the proportions of cryptos invested by Coinbase venture and Binance Labs (including cryptos launched on Binance Launchpad) across different samples. We label a crypto as invested by Coinbase when it is in the portfolio of Coinbase venture; a crypto as invested by Binance when it is in the portfolio of Binance Labs or listed on Binance Launchpad. Note that: (a) Among 92 cross-listed cryptos, 4 cryptos (LTC, CLV, ICP and OXT) do not have trading data around Coinbase listing announcement date; another 4 of them (AAVE, FET, MATIC and SKL) do not have trading data around Binance listing announcement date. For above reason, the observations of Coinbase Listed + Binance Listed – Cross-Listed sample is not equal to the Full sample. (b) We want to show whether Coinbase invested cryptos are more likely listed on Coinbase compared to Binance and vice versa. ***, **, * stands for 1%, 5% and 10% significant level respectively.

Sample	Obs.	Cryptos invested by Coinbase		Cryptos invested by Binance		Cryptos Invested by both Coinbase and Binance	
		Obs.	%	Obs.	%	Obs.	%
		(1)	(2)	(3)	(4)	(5)	(6)
Full Sample	328	28	8.54	44	13.41	4	1.22
Coinbase Listed	112	19	16.96	10	8.93	1	0.89
Binance Listed	300	19	6.33	42	14.00	3	1.00
		[b]Propensity of listed on Coinbase – propensity of listed on Binance	10.63***		-5.07		
		(t-statistic)	(2.78)		(-1.51)		
Cross-Listed sample	92[a]	11	11.96	10	10.87	1	1.09
Non-Cross-Listed sample	236	17	7.20	34	14.41	3	1.27

TABLE 9

Comparisons between Exchange Invested and Non-Invested Cryptos

Table 9 examines whether the exchange (Coinbase or Binance) invested cryptos perform differently from exchange non-invested cryptos. Panel A presents whether Coinbase invested cryptos exhibit technology advancements compared to Coinbase non-invested cryptos for the Coinbase listed sample. Panel B presents the corresponding results to Panel A for the Binance sample. Panel C presents the differences of listing effects across Coinbase invested and non-invested cryptos for Coinbase listed sample. Panel D presents the corresponding results to Panel C for the Binance sample. Median diff. test means Wilcoxon rank-sum (Mann-Whitney) test. ***, **, * stands for 1%, 5% and 10% significant level respectively. Due to crypto "*MCO*" is untracked when the collected GitHub data, the total observation in Panel D is 42+257 = 299 (= 300-1).

Panel A. Technology Development Comparisons for Coinbase Sample

Variables	Coinbase-invested sample (obs. =19)		Non-Coinbase-invested sample (obs. =93)		Difference between Coinbase invested and non-invested samples	
	(1) Mean	(2) Median	(3) Mean	(4) Median	(5) = (1)-(3) Mean diff. (t-stat.)	(6) = (2)-(4) Median diff. (z-stat.)
Coin	0.211	0.000	0.194	0.000	0.017	0.000
					(0.168)	(0.169)
GitHub	0.158	0.000	0.237	0.000	-0.079	0.000
					(-0.746)	(-0.747)
Commits	5.510	4.644	7.452	8.097	-1.942	-3.453
					(-1.453)	(-1.528)
Stars	5.439	6.227	6.363	7.072	-0.924	-0.845
					(-0.646)	(-1.004)
Issues	2.857	3.497	4.105	4.875	-1.248	-1.378
					(-1.032)	(-1.180)

Panel B. Technology Development Comparisons for Binance Sample

Variables	Binance-invested sample (obs. =42)		Non- Binance-invested sample (obs. =257)		Difference between Binance invested and non-invested samples	
	(1) Mean	(2) Median	(3) Mean	(4) Median	(5) = (1) - (3) Mean diff. (t-stat.)	(6) = (2) - (4) Median diff. (z-stat.)
Coin	0.119	0.000	0.333	0.000	-0.214***	0.000***
					(-2.828)	(-2.795)
GitHub	0.095	0.000	0.226	0.000	-0.131*	0.000*
					(-1.939)	(-1.930)
Commits	6.984	6.682	7.222	7.890	-0.238	-1.208
					(-0.196)	(-0.633)
Stars	4.942	4.783	5.774	6.443	-0.832	-1.660
					(-0.735)	(-1.101)
Issues	2.739	2.110	3.460	3.497	-0.721	-1.387
					(-0.673)	(-0.603)

Panel C. Cumulated Return Comparisons for Coinbase Sample

Variables	Coinbase-invested sample (obs. =19)		Non-Coinbase-invested sample (obs. =93)		Difference between Coinbase invested and non-invested samples	
	(1) Mean (t-stat.)	(2) Median (z-stat.)	(3) Mean (t-stat.)	(4) Median (z-stat.)	(5) =(1)-(3) Mean Diff. (t-stat.)	(6) =(2)-(4) Median Diff. (z-stat.)
$CR_{[0]}$	0.470***	0.171***	0.299***	0.188***	0.171	-0.017
	(2.985)	(3.441)	(7.002)	(7.734)	(1.450)	(0.353)
$CR_{[0, 4]}$	0.492**	0.275**	0.408***	0.199***	0.083	0.076
	(2.726)	(2.334)	(5.951)	(5.933)	(0.485)	(0.043)
$CR_{[0, 9]}$	0.393**	0.203*	0.393***	0.150***	-0.000	0.053
	(2.149)	(1.650)	(5.446)	(4.891)	(-0.002)	(-0.306)
$CR_{[0, 29]}$	0.378*	0.164*	0.408***	0.205***	-0.031	-0.041
	(2.045)	(1.851)	(4.800)	(4.266)	(-0.150)	(0.074)
$CR_{[0, 179]}$	1.094***	0.834***	0.790***	0.656***	0.304	0.178
	(3.249)	(2.900)	(6.360)	(5.376)	(0.934)	(0.672)
$CR_{[-1]}$	0.032	0.018*	0.034**	0.012	-0.002	0.006
	(1.044)	(1.706)	(2.153)	(1.293)	(-0.055)	(0.592)
$CR_{[-5, -1]}$	0.169*	0.090**	0.111***	0.050***	0.058	0.040
	(1.882)	(2.272)	(3.459)	(3.026)	(0.671)	(0.727)
$CR_{[-10, -1]}$	0.246*	0.161**	0.210***	0.096***	0.037	0.065
	(2.006)	(2.101)	(4.768)	(4.247)	(0.306)	(0.385)
$CR_{[-30, -1]}$	0.589***	0.354***	0.362***	0.328***	0.227	0.026
	(3.486)	(2.953)	(4.998)	(4.785)	(1.195)	(1.050)

Panel D. Cumulated Return Comparisons for Binance Sample

	Binance -invested sample (obs. =42)		Non- Binance -invested sample (obs. =258)		Difference between Binance invested and non-invested samples	
	(1)	(2)	(3)	(4)	(5) = (1)-(3)	(6) = (2)-(4)
	Mean	Median	Mean	Median	Mean Diff.	Median Diff.
	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)	(t-stat.)	(z-stat.)
$CR_{[0]}$	0.284***	0.152**	0.218***	0.098***	0.066	0.054
	(2.975)	(2.445)	(7.086)	(7.477)	(0.806)	(0.127)
$CR_{[0, 4]}$	0.311**	0.103*	0.154***	0.052***	0.157	0.051
	(2.571)	(1.807)	(4.031)	(3.013)	(1.534)	(0.808)
$CR_{[0, 9]}$	0.222*	0.110	0.154***	0.046***	0.068	0.064
	(1.890)	(1.194)	(3.719)	(2.708)	(0.611)	(0.221)
$CR_{[0, 29]}$	0.223*	0.167	0.266***	0.071***	-0.044	0.096
	(1.793)	(1.344)	(4.779)	(3.387)	(-0.292)	(-0.178)
$CR_{[0, 179]}$	1.120***	1.015***	0.854***	0.590***	0.265	0.425
	(4.633)	(3.963)	(8.166)	(7.054)	(0.950)	(1.146)
$CR_{[-1]}$	0.081**	0.032**	0.058***	0.020***	0.023	0.012
	(2.488)	(2.487)	(4.921)	(3.647)	(0.634)	(1.079)
$CR_{[-5, -1]}$	0.263***	0.177***	0.187***	0.107***	0.076	0.070**
	(4.810)	(4.153)	(7.635)	(7.654)	(1.005)	(1.997)
$CR_{[-10, -1]}$	0.338***	0.446***	0.311***	0.215***	0.027	0.231
	(5.088)	(3.511)	(9.547)	(8.785)	(0.265)	(1.088)
$CR_{[-30, -1]}$	0.685***	0.537***	0.555***	0.368***	0.130	0.169
	(4.850)	(4.015)	(9.490)	(8.416)	(0.717)	(1.244)

TABLE 10

Sample Selection and Sample Distribution

Table 10 reports the sample selection process of all qualified crypto exchanges and lists the top 12 crypto exchanges based on the number of listed cryptos.

Panel A. Sample Selection of All-Qualified Exchanges

Criteria	Observations
Cryptos-exchange listed	12511
(Retain) matched with data in Coinmarketcap	5859
(Retain) exchange information available	5596
(Retain) cryptos listed at least three exchanges	4590
(Retain) cryptos listed at different exchanges at different dates	4181
Final sample	4181

Panel B. Top Exchanges in the All-Qualified Exchanges Sample

Exchange (1 to 6)	Percentage (%)	Exchange (7 to 12)	Percentage (%)
HitBTC	5.48	Huobi	3.52
Binance	5.36	OkEX	3.47
Bittrex	5.00	UPbit	3.44
OneInch	4.69	CoinEx	3.37
KuCoin	4.69	Coinbase	3.06
Uniswap V3	4.47	Poloniex	2.80
Total	29.69		19.66

TABLE 11

Descriptive Statistics

Table 11 summarizes main variables for all-qualified exchanges sample. All variables are defined in the Appendix.

Panel A. All-Qualified Exchanges' Observations

Variables	Obs.	Mean	Std. Dev.	Q1	Median	Q3
CR	4,181	0.029	0.163	-0.041	0.004	0.059
TOP	4,181	0.493	0.500	0.000	0.000	1.000
EXT	4,181	0.591	0.492	0.000	1.000	1.000
DEX	4,181	0.147	0.354	0.000	0.000	0.000
NUM	4,181	2.114	0.805	1.386	2.079	2.708

Panel B. All-Qualified Exchanges with Regulatory Data

Variables	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Listed	2,659	0.110	0.313	0.000	0.000	0.000
Licensed	2,659	0.832	0.374	1.000	1.000	1.000
Country_Reg	2,659	1.165	0.906	0.000	1.000	2.000
BVI	2,659	0.211	0.408	0.000	0.000	0.000
Exchange_Reg	2,659	1.897	1.354	0.000	2.000	3.000

TABLE 12

Regression Results of Model (1)

Table 12 uses the listing date raw return for cryptocurrency as the dependent variable in each column. All variables are defined in the Appendix. Cryptocurrency and listing month fixed effects are included. T-statistics based on robust adjusted are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Dep. Var.=	*CR*	*CR*	*CR*	*CR*
TOP	0.018***			0.018***
	(2.79)			(2.80)
EXT		-0.000		0.000
		(-0.08)		(0.03)
DEX			-0.005	-0.005
			(-0.53)	(-0.49)
NUM	-0.052***	-0.056***	-0.056***	-0.052***
	(-3.36)	(-3.64)	(-3.66)	(-3.33)
Constant	0.130***	0.147***	0.148***	0.131***
	(3.81)	(4.33)	(4.46)	(3.71)
Crypto FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Obs.	4181	4181	4181	4181
Adjusted R^2	0.126	0.124	0.124	0.126

TABLE 13

Regression Results of Model (2)

Table 13 uses the listing date raw return for cryptocurrency as the dependent variable in each column. All variables are defined in the Appendix. Cryptocurrency and listing month fixed effects are included. T-statistics based on robust adjusted are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dep. Var.=	(1) OLS *CR*	(2) OLS *CR*	(3) OLS *CR*	(4) OLS *CR*	(5) OLS *CR*
Listed	-0.006				
	(-0.48)				
Licensed		0.026***			
		(2.96)			
Country_Reg			0.008**		
			(2.35)		
BVI				-0.017*	
				(-1.71)	
Exchange_Reg					0.006***
					(2.73)
NUM	-0.065***	-0.064***	-0.066***	-0.066***	-0.066***
	(-3.05)	(-3.00)	(-3.11)	(-3.10)	(-3.10)
Constant	0.166***	0.141***	0.158***	0.171***	0.155***
	(3.61)	(3.03)	(3.46)	(3.69)	(3.39)
Crypto FE	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes
Obs.	2659	2659	2659	2659	2659
Adjusted R^2	0.240	0.242	0.241	0.241	0.242

TABLE 14

Regression Results of Model (3)

Table 14 uses the listing date raw return for cryptocurrency as the dependent variable in each column. All variables are defined in the Appendix. Cryptocurrency and listing month fixed effects are included. T-statistics based on robust adjusted are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) OLS	(2) OLS	(3) OLS	(4) OLS
Dep. Var.=	*CR*	*CR*	*CR*	*CR*
Exchange_Reg	0.006**	0.008***	-0.001	-0.020
	(2.41)	(3.17)	(-0.41)	(-1.42)
TOP	0.023***	0.014*	-0.004	-0.027
	(2.93)	(1.79)	(-0.28)	(-1.37)
*Exchange_Reg*TOP*			0.013**	0.015**
			(2.22)	(2.03)
EXT		0.015*		-0.034*
		(1.82)		(-1.93)
*Exchange_Reg*EXT*				0.026***
				(3.44)
NUM		-0.061***		-0.068***
		(-2.72)		(-2.70)
*Exchange_Reg*NUM*				0.004
				(1.07)
Constant	0.005	0.126**	0.019**	0.188***
	(0.68)	(2.47)	(2.10)	(2.78)
Crypto FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Obs.	2659	2659	2659	2659
Adjusted R^2	0.232	0.244	0.234	0.251