Internet Appendix:

Gambling on Crypto Tokens?

I. Institutional Details

A. Initial Coin Offerings

An Initial Coin Offering (ICO) is a popular fundraising method used primarily by startups in the cryptocurrency and blockchain domains. The first step in a typical ICO involves the creation of a whitepaper that outlines the details about the company/project, the amount of funding required, and how long the ICO campaign remains active, among other things.

The next step in the ICO process is the creation of tokens, which are representations of an asset or utility in the blockchain. These tokens are fungible and tradeable. Unlike stocks, tokens do not provide an equity stake in the company. Instead, most tokens deliver their owners some stake in a product or service created by the company. Moreover, these tokens serve as the only medium of exchange for the future product or service provided by the company. The offering of these tokens to investors can be structured in several rounds. The company uses the ICO proceeds to launch a new product or service. Investors can expect to benefit from this product or service or from the appreciation of the tokens' value.

Broadly, the ICO process incorporates features of both the traditional Initial Public Offering (IPO) process and the crowdfunding process, with several key differences. While IPOs provide investors with an ownership stake in the firm, ICOs provide investors with a utility token to pay for future products and services. More importantly, while IPOs require the involvement of investment banks, ICOs are decentralized and do not require any intermediaries in the capital-generation process. ICOs are also more likely to deal with investors who are keen to invest in a specific new project, similar to a crowdfunding event. However, ICO backers are motivated by the prospective return on their investments, while crowdfunding events are essentially prepayments for future products and services.

B. Non-Fungible Tokens

Non-fungible tokens (NFTs) are assets stored on the blockchain that typically represent ownership of unique digital items. NFTs are generally intended to represent digital artwork, where the ownership of the NFT signifies ownership of the underlying artwork. The vast majority of NFTs are deployed on the Ethereum blockchain, and thus, the prices for NFTs are usually quoted in Ether (ETH).

The growing literature on the NFT market has documented the similarities between NFTs and collectibles and art (Oh et al. (2023)). Firstly, similar to pieces of art, NFTs are scarce goods that are uniquely identifiable. Second, individual NFTs are usually marketed as part of a broader collection, where each NFT in a given collection shares certain features that are specific to that collection. For example, the popular NFT collection, *Bored Ape Yacht Club*, includes 10,000 NFTs that involve an ape but with slight variations in features and accessories.[19,20] Lastly, NFT ownership also serves as a status signal and can provide owners with access to virtual social groups or in-person events that are otherwise exclusive.

The primary market for NFTs involves "minting" – i.e., the process by which NFTs are first created on the blockchain and sold to investors. In most cases, the creator of an NFT collection sets up a smart contract to deploy NFTs directly to the public at a pre-specified "mint price" (i.e., offering price). NFT collections maintain websites and Twitter accounts that provide detailed information about the collection, including the dates on which buyers can purchase newly minted tokens (the minting period) as well as the price per NFT. As part of the purchase transaction, buyers send the pre-specified mint price to the NFT collection smart contract and receive an NFT from the collection. In general, there is wide variation across collections in both mint prices and the number of NFTs available for minting.

After minting, NFTs can be traded in the secondary market. OpenSea is the most popular secondary market trading platform for NFTs. There are three important fees associated with NFT trading. The first is the transaction fee charged by the trading platform. NFT trades also feature a royalty fee, which is a fixed fraction of the transaction price paid back to the creator. Lastly, NFT trades also feature a "gas" fee. In this context, gas refers to the transaction fee for any interaction with the Ethereum blockchain.

II. Variable Definitions

A. DMA–Level Variables

The demographic data described in this section is gathered at the Designated Market Area (DMA) level. In addition, the data is gathered as of December 2015, unless specified otherwise.

- *Lottery sales per capita*: The ratio of lottery sales to total adult population at the DMA level.

[19] See: `https://opensea.io/collection/boredapeyachtclub`.

[20] Importantly, the difference between two NFTs of the collection can be as trivial as a single pixel or single byte of data. Despite the similarity among such NFTs, each NFT will be assigned different token IDs (Sahoo, Paul, Shah, Hornback, and Chava (2023)).

- *Median income ($ '000s)*: The median income of the residents of a DMA, reported in thousands of dollars.
- *Population ('000s)*: The total number of residents of a DMA, reported in thousands.
- *Income inequality*: The ratio of the 80th percentile to the 20th percentile of a DMA's income distribution.
- *Minority ratio*: The ratio of the number of racial minority residents to the total population at the DMA level.
- *Non-college ratio*: The ratio of the number of adults with no college-level education to the total adult population at the DMA level.
- *Rural score*: Rural-Urban Commuting Area Codes (RUCA) range from 1 to 10, with 1 representing metropolitan commuting areas and 10 representing rural commuting areas.
- *Majority male (0/1)*: Indicator variable that equals 1 if DMA's male population is higher than that of women, and 0 otherwise.
- *Catholic/Protestant ratio*: The ratio of Catholic residents to Protestant residents at the DMA level.
- *Broadband access ratio*: The ratio of the number of residents that have access to broadband internet speeds to the total population at the DMA level.
- *Fraction $<$ 25 years old*: The ratio of the number of adult residents under the age of 25 to the total adult population at the DMA level.
- *Married ratio*: The ratio of the number of married individuals to the total population at the DMA level.
- *Unemployment rate*: The ratio of the number of unemployed residents to the total labor force at the DMA level.
- *CFPB complaints per 1000 residents*: The number of complaints for consumer financial fraud submitted to the CFPB at the DMA level per thousand residents; constructed using data from the CFPB Complaints Database.
- *2016 election Libertarian Party vote share*: DMA–level vote share of Libertarian Party candidates during the 2016 US Senate elections.

- *Regional risk-taking preferences*: Constructed using individual-level survey data from Falk et al. (2018) and Falk et al. (2023). The measure is constructed using U.S. state-level data, which is the narrowest regional classification available. For DMAs that span across state borders, we use the average weighted by the population that the DMA has in the bordering states.

- *Advertisement spending by crypto firms*: The DMA–level variation in advertising expenses by three major cryptocurrency exchanges – FTX Trading Ltd., Coinbase, and Binance – constructed using data gathered from Vivvix. Importantly, Vivvix does not report advertising expenses by ICO or NFT collection or even for a broad "crypto" category. Moreover, the crypto advertising data is only available for 2021 and 2022. Lastly, the data is only available for the top 100 DMAs, and the advertising expenses for the remaining 109 DMAs are assumed to be $0. This spending measure is then scaled by the DMA's population to generate a per-capita measure.

- *% Population in default on debt obligations*: Ratio of the number of consumers in default on any of their debt accounts to the total population at the DMA level. Default is defined as being more than ninety days past due on a debt account. This variable is measured at a monthly frequency from January 2016 to June 2019.

B. ICO–Level Variables

- *Token retention (%)*: The fraction of tokens retained by project entrepreneurs during an ICO.

- *KYC (0/1)*: Indicator variable that equals 1 if the ICO requires contributors to pass know-your-customer verification before purchasing tokens, and 0 otherwise.

- *Accelerated pricing (0/1)*: Indicator variable that equals 1 if the ICO token price increases over time, and 0 otherwise.

- *Platform (0/1)*: Indicator variable that equals 1 if the ICO project is a blockchain infrastructure platform, and 0 otherwise.

- *Pre-sale (0/1)*: Indicator variable that equals 1 if the ICO has a pre-sale event targeting specific potential investors (often at a lower price) before offering to the general public, and 0 otherwise.

- *White paper (0/1)*: Indicator variable that equals 1 if the entrepreneurial team behind the ICO releases a white paper about its project at or before ICO, and 0 otherwise.

- *GitHub presence (0/1)*: Indicator variable that equals 1 if the entrepreneurial team behind the ICO makes its code available on GitHub at or before ICO, and 0 otherwise.
- *Team disclosure (0/1)*: Indicator variable that equals 1 if the entrepreneurial team behind the ICO discloses detailed team member identity and information at or before ICO, and 0 otherwise.
- *Funds raised ($ '000s)*: The total funds raised during an ICO, reported in thousands of dollars.
- *Funds raised (log)*: The natural log of the total funds raised during an ICO.
- *Funds raised (frac. of hard-cap)*: The total funds raised during an ICO as a fraction of the ICO's "hard-cap." The ICO hard-cap represents the maximum amount of funds the ICO is looking to collect.
- *# Contributors*: The number of unique blockchain wallets that contribute to an ICO wallet address during that particular token's ICO period.

C. NFT Collection–Level Variables

- *Total token supply*: The total number of tokens available for sale in the primary market.
- *Advertises rare items (0/1)*: Indicator variable that equals 1 if the NFT collection advertises rare items as part of its collection, and 0 otherwise.
- *Has Twitter presence (0/1)*: Indicator variable that equals 1 if the NFT collection is present on Twitter, and 0 otherwise.
- *Has Discord presence (0/1)*: Indicator variable that equals 1 if the NFT collection is present on Discord, and 0 otherwise.
- *Creator's royalty fees (pp)*: Percentage of the sale price that the original creator receives each time an NFT from the collection is sold on the secondary market. This is a way for the NFT artist to earn money after the initial mint period.
- *Funds raised in ETH (log)*: The natural log of the funds raised by the NFT collection in the primary market.
- *# Days to mint 99%*: The number of days it takes until at least 99% of the total tokens available for sale in the primary market are sold.

- *# Minting wallets*: The number of unique wallet addresses involved in the primary market purchase period of an NFT collection.

D. Retail Crypto Attention

- *ICO–DMA SVI*: The DMA–level variation in retail investor attention received by any ICO in the [0,+14] day window relative to the ICO date.
- *NFT collection–DMA SVI*: The DMA–level variation in retail investor attention received any NFT collection between the introduction of the NFT collection and February 28, 2022.
- *Crypto wallet–DMA SVI*: The DMA–level variation in the retail investor attention received by major crypto wallets in the [0,+14] day window relative to the launch of the crypto token. The crypto wallets considered for ICOs are MetaMask, MyEtherWallet, and Coinbase Wallet, while the crypto wallets considered for NFT collections are MetaMask and Coinbase Wallet, as well as the NFT trading platform, OpenSea
- *ICO SVI*: Retail investor attention toward ICOs in the U.S., comparable between different ICOs.
- *NFT collection SVI*: Retail investor attention toward NFT collections in the U.S., comparable between different NFT collections.

TABLE A.1

Robustness: Alternative NFT Collection Retail Attention Window

This table reports results documenting the robustness of the relationship between regional gambling propensities and retail NFT collection attention to an alternate attention window. The dependent variable is the regional attention generated by NFT collections in the [0,+14] day window since the collection release date. Robust standard errors, double-clustered at the NFT collection and DMA levels, are presented in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels.

	1	2
Lottery sales per capita	2.758**	1.562*
	(1.361)	(0.918)
N	1,793	1,793
NFT collection fixed effects		✓
DMA controls		✓
Adj. R-squared	0.013	0.346

TABLE A.2

Sports Gambling Legalization Dates Across States

This table reports the dates on which sports gambling was legalized across different states.

State	Legalization date
Nevada	January 1, 2016
New Jersey	June 1, 2018
Delaware	June 1, 2018
Mississippi	August 1, 2018
West Virginia	August 1, 2018
New Mexico	October 1, 2018
Pennsylvania	October 1, 2017
Rhode Island	June 1, 2018
New York	June 1, 2013*

*Legalization occurred in 2013, but sports bets could start being placed from March 1, 2018.