Should All Blockchain-Based Digital Assets be Classified under the Same Asset Class?

(Previously called: Digital Tokens from Machine Learning Perspectives)

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Motivation:

Formally announced: 18 June 2019
Expected to be released: 2020
(Currently on hold)

**There are actually 2 types
of digital assets in this project**

1) **Libra Coin - Stablecoin**
2) **Libra Investment Token**

- **Do they take the same roles in the financial system?**
- **Should they be subject to the same rules & regulations?**
- **Are they supposed to be regulated by the same regulators?**

Blockchain-Based Digital Assets

- **Blockchain-Based Digital Assets** — digital assets created on blockchain to serve certain purposes intended by their creator(s)

- Terms used: **digital tokens, digital coins, cryptocurrencies**

  - No standardized definition — different people may mean different things

  - In this paper (although some people may disagree):

    - Blockchain-based digital assets* -> digital tokens = digital coins
      (Active: currently traded in the secondary markets and have price information)

    - Cryptocurrencies (= payment tokens) are a subset of digital tokens/coins

* When we use the term "blockchain-based digital assets" we actually mean "digital tokens." (The reason why we did not use the word "digital tokens" in our title because some people may think we exclude "cryptocurrencies.") We acknowledged that "blockchain-based digital assets" have a broader definition and there are other types of blockchain-based digital assets such as the tokenization of the physical assets and items created for fun like CryptoKitties. But these assets/items are currently out of the scope of this paper.

Thailand

หากให้อิงคำจำกัดความตาม **พระราชกำหนดการประกอบธุรกิจสินทรัพย์ดิจิทัล พ.ศ. 2561** นั้น พรก. ให้
คำจำกัดความ "คริปโทเคอร์เรนซี," "โทเคนดิจิทัล," และ "สินทรัพย์ดิจิทัล" ตามนี้:

- "คริปโทเคอร์เรนซี" หมายความว่า หน่วยข้อมูลอิเล็กทรอนิกส์ซึ่งถูกสร้างขึ้นบนระบบหรือเครือข่าย
  อิเล็กทรอนิกส์ โดยมีความประสงค์ที่จะใช้เป็นสื่อกลางในการแลกเปลี่ยนเพื่อให้ได้มาซึ่งสินค้า บริการ หรือสิทธิอื่น
  ใด หรือแลกเปลี่ยนระหว่างสินทรัพย์ดิจิทัล และให้หมายความรวมถึงหน่วยข้อมูล อิเล็กทรอนิกส์อื่นใดตามที่คณะ
  กรรมการ ก.ล.ต. ประกาศกำหนด   **In this paper: "Cryptocurrencies" = "Payment Tokens"**

- "โทเคนดิจิทัล" หมายความว่า หน่วยข้อมูลอิเล็กทรอนิกส์ซึ่งถูกสร้างขึ้นบนระบบหรือเครือข่าย อิเล็กทรอนิกส์
  โดยมีวัตถุประสงค์เพื่อ   **In this paper: "ICO Tokens"**

1. กำหนดสิทธิของบุคคลในการเข้าร่วมลงทุนในโครงการหรือกิจการใด ๆ
2. กำหนดสิทธิในการได้มาซึ่งสินค้าหรือบริการหรือสิทธิอื่นใดที่เฉพาะเจาะจง ทั้งนี้ ตามที่กำหนด ในข้อตกลง
   ระหว่างผู้ออกและผู้ถือ และให้หมายความรวมถึงหน่วยแสดงสิทธิอื่นตามที่คณะกรรมการ ก.ล.ต. ประกาศกำหนด

- "สินทรัพย์ดิจิทัล" หมายความว่า คริปโทเคอร์เรนซีและโทเคนดิจิทัล

  In this paper: "Digital Tokens"

http://www.ratchakitcha.soc.go.th/DATA/PDF/2561/A/033/43.PDF
https://techsauce.co/news/thai-laws-about-ico-and-cryptocurrency

Thailand

โดยมีการปรับคริปโทเคอร์เรนซีออกจากรายชื่อเดิมจำนวน 3 ตัว
ได้แก่ Bitcoin Cash (BCH), Ethereum Classic (ETC), และ Litecoin (LTC)

https://www.hoonsmart.com/archives/47488

https://www.sec.or.th/TH/Pages/News_Detail.aspx?SECID=7345&NewsNo=23&NewsYear=2562&Lang=TH

https://icorating.com/ico/all/

One way to classify the digital tokens
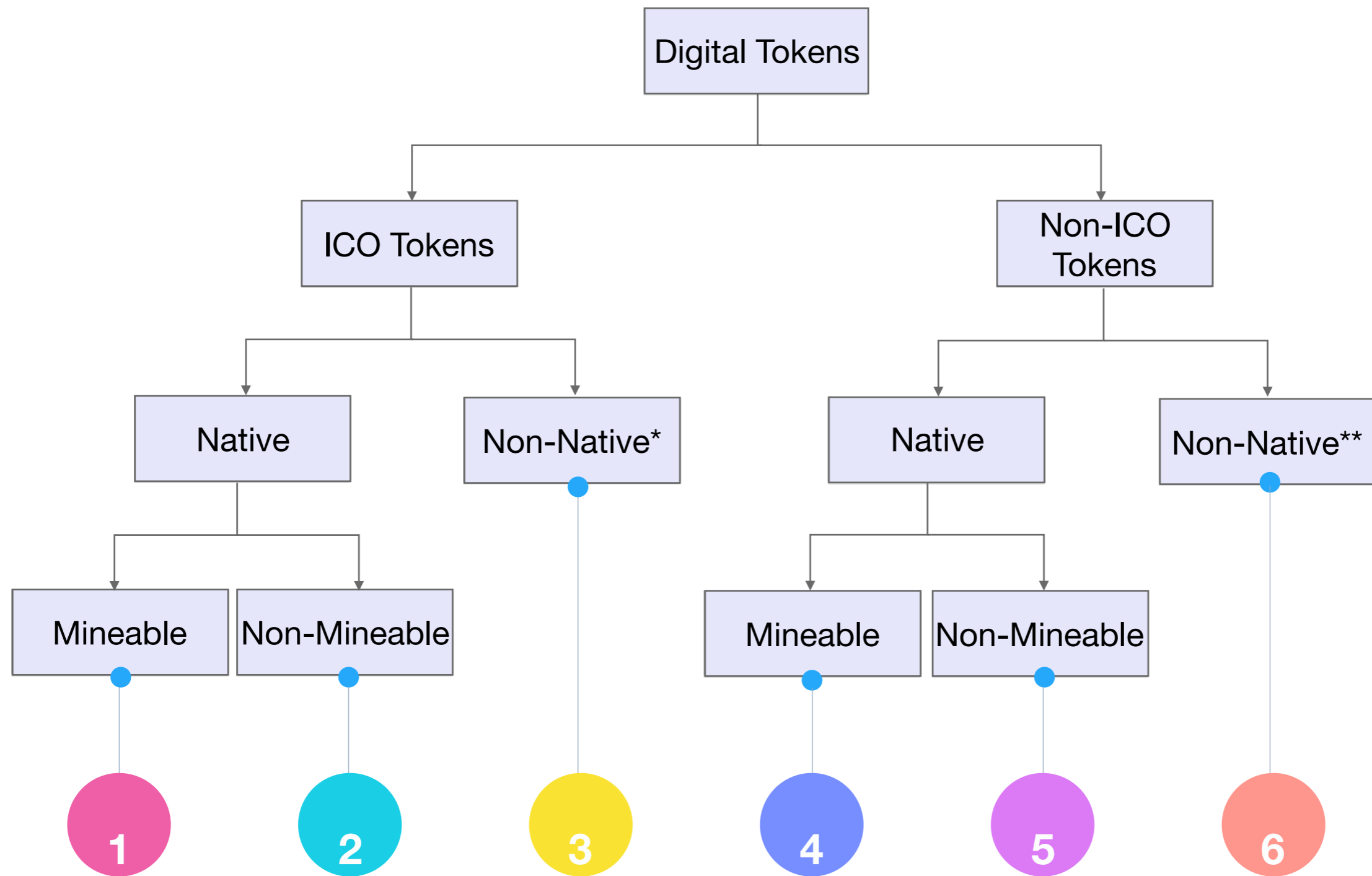
Source: Created by the authors based on our understanding

- Stablecoins should be a subset of Group #6 (or Groups #5)
- Security Tokens/STOs should be a subset of Group #3 (or Group #2)

* All ICO tokens that are non-native are non-mineable
except for a very special case (e.g. Genaro Network).   6   ** All non-ICO tokens that are non-native are non-mineable.

Explanation of Terms Used

- **ICO (Initial Coin Offering)**: A method of fundraising in which companies issue digital tokens (**ICO Tokens**) to investors in exchange for their fund investing into the companies or the companies' projects.

- **Non-ICO Tokens**: Digital tokens that were not created via ICO process. They could have been mined (like bitcoin) or could have been initially distributed using the "airdrop" process (given out for free to certain groups of people — usually with existing wallets).

- **Native Digital Tokens***: Digital tokens that have their own blockchain (therefore they are "native" digital assets of that blockchain) and can operate independently.

- **Non-Native Digital Tokens****: Digital tokens that do not have their own blockchain therefore have to reside on other blockchain (usually on Ethereum blockchain).

* coinmarketcap.com defines our "native digital tokens" as "coins"
** coinmarketcap.com defines our "non-native digital tokens" as "tokens"

Explanation of Terms Used (Cont.)
Native vs. Non-Native

Non-Native Tokens

MaidSafe FoldingCoin Bancor Basic Attention Token Golem

Tether GetGems Storj Status

Protocol

Omni Counterparty Ethereum

Blockchain Technology

Bitcoin Ethereum

Source: Authors' recreation of the figure based on
Tokenomics (2018) by Sean Au and Thomas Power and https://tokenmarket.net/blockchain/ethereum/assets/

Explanation of Terms Used (Cont.)

- **Mineable Tokens**: Digital tokens that can be created during transaction verification process (usually involves solving mathematical problems)

- **Non-Mineable Tokens**: The opposite of mineable tokens.

- **Stablecoins**: Digital tokens that have their value pegged to other fiat currency or other asset.
  - Fiat-Collateralized: Tether, TrueUSD, Gemini Dollar, USD Coin
  - Crypto-Collateralized: DAI (on Maker), bitUSD, bitEUR, bitCNY (on Bitshares), bitGold, bitSilver, bitBTC (on Bitshares)
  - Non-Collateralized: NuBits, Carbon, Basis

- **STO (Security Token Offering)**: Similar to ICO but the digital tokens issued are debt or equity claims against the issuers. (Digital tokens that have properties similar to derivatives could also be created.)
  - Some of the ICO tokens were deemed "security" by US SEC
  - Therefore, we take a view that STO is a subset of ICO*

* However, the actual process of intentionally issuing the "Security Token" via the STO process may require more regulatory steps, requirements, and scrutiny.

Other ways to classify the digital tokens

No standardized consensus on how they should be classified
Classifications are not mutually exclusive

- **FINMA* specifically classifies the [ICO] tokens [by functions] as:**
  - Payment tokens**
  - Utility tokens
  - Asset tokens

- **US SEC+:**
  - Recognizes "Cryptocurrencies" — Bitcoin, Ethereum
  - Recognizes "Utility tokens"
  - Uses "Howey Test" to determine whether something is considered "Security" — DAO (no longer exist), Paragon Coin, AirToken
  - Recognizes "Security Offering"

- **Other plausible ways to classify**
  - by industry, by issuer, etc.

Main Objectives of the Paper

- **To explore and investigate whether each type of digital tokens should be classified under the same asset class**
  - Criteria:
    - Creation — How were they created and initially distributed?
    - Intention — What were their intended properties?
    - Actual usage — How are they actually currently used/treated?
    - Behaviors/properties — Risk and return profiles, Correlation distance

- **To discuss policy implications and recommendations**

Theoretical Framework
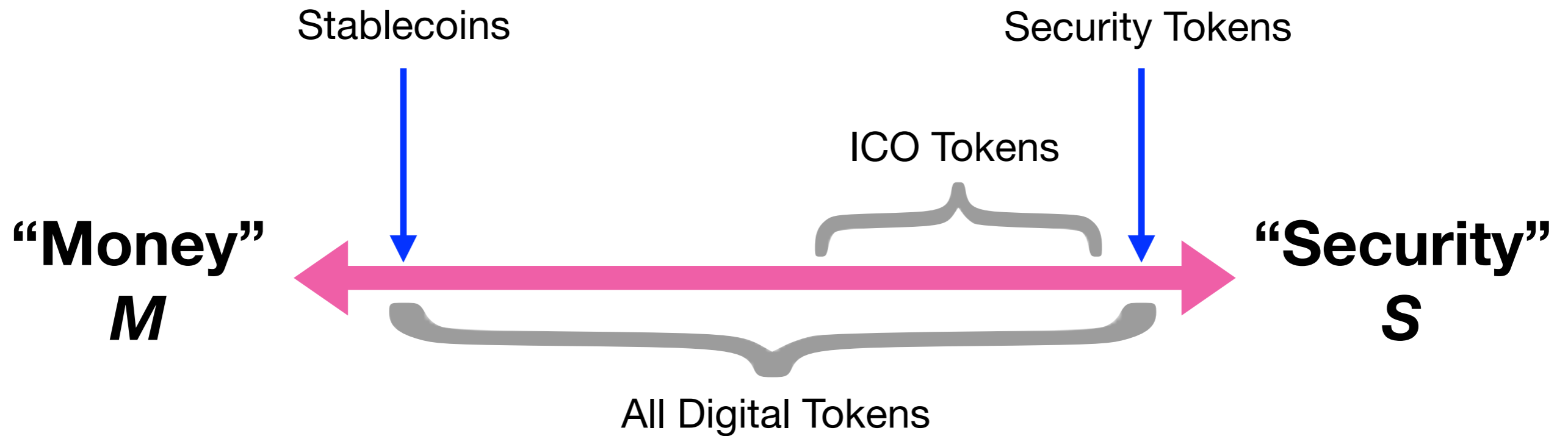
$$x_i = \lambda_i M + (1 - \lambda_i)S$$

$$0 \leq \lambda_i \leq 1$$

x_i — **Digital Token *i*** λ_i — **Digital Token *i*'s parameter**

Theoretical Framework
(Adding another "dimension"?)

?   – "Commodity"?
        – Other thing?

"Money"
M

"Security"
S
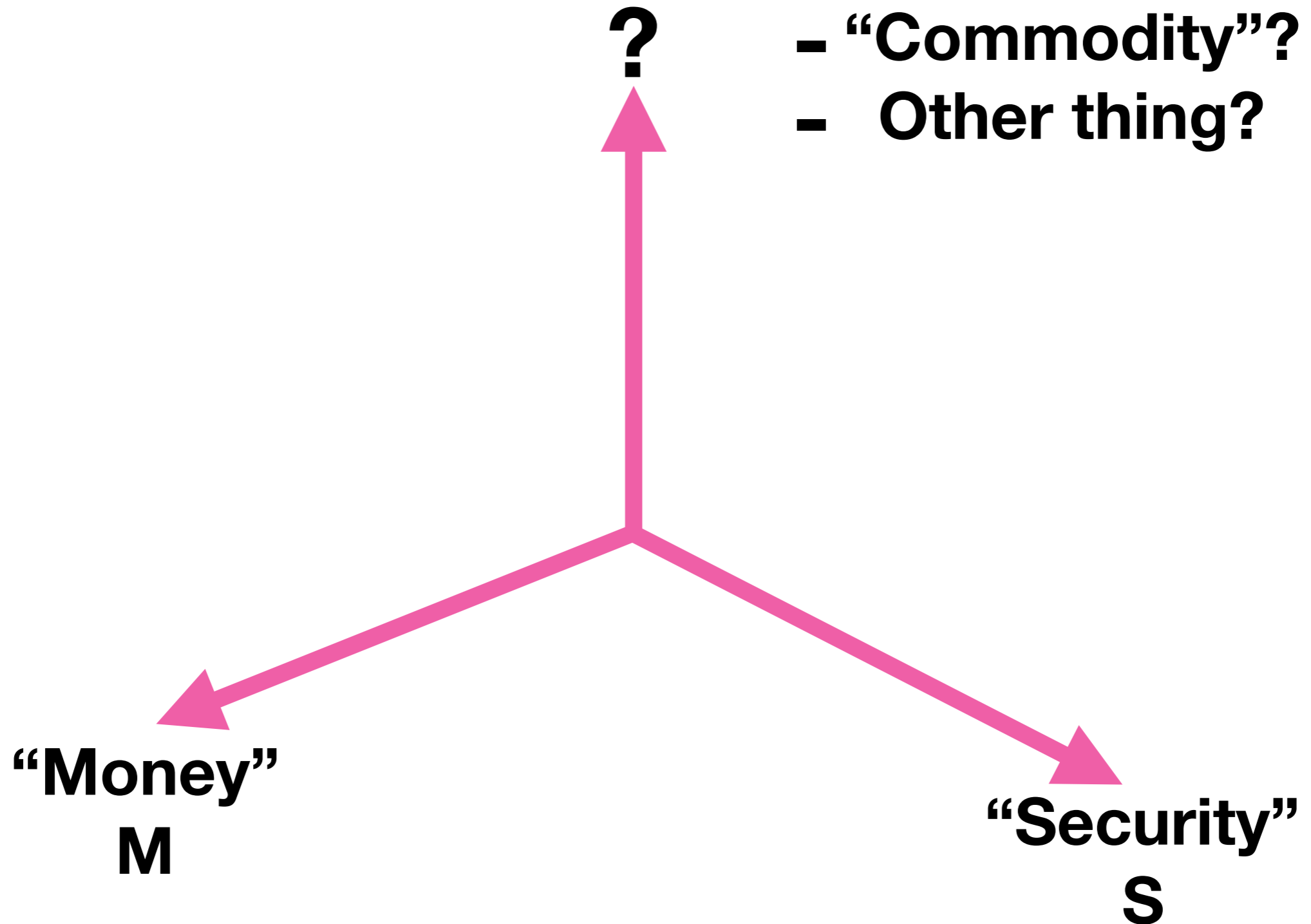
Data and Methodology

- **Data**
  - Behavioral Data (Price, etc.) from coinmarketcap.com
  - White Papers
- **Methodology**
  - Discussion/Conceptual analysis
  - Text mining (examples — but all can be done)
  - Comparison of risk and return profiles (examples — but all can be done)
  - Visualization of correlation distance
- **Sample Selection**
  - About 2,000+ active digital tokens listed on coinmarketcap.com
  - For this paper, we chose the ones with at least one year of price data (as of 28 Feb 2019) and at least USD 100,000 market cap
    - 809 digital tokens
    - About 512 digital tokens (out of 809) have downloadable & readable white papers

How to show they belong to the same or different asset class?

- **Creation** — How were they created and initially distributed?
  - Discussion/Conceptual Analysis
- **Intention** — What were their intended properties?
  - Discussion/Conceptual Analysis
  - Text mining of white papers
- **Actual usage** — How are they actually currently used/treated?
  - Discussion/Conceptual Analysis
  - How they are traded in the secondary markets
- **Behaviors/properties**
  - Graphs and calculation of risk and return profiles
  - Visualization of correlation distance

How were they created and initially distributed?

- **ICO Tokens***
  - They have a primary market; They have the initial price; Information is available on how much fund they have raised
  - Companies obtain funds from investors and give them the ICO tokens; The investors expect future returns from their investments
  - Most of them have white papers
  - The literature has tried to compare ICO with IPO
- **Non-ICO Tokens**
  - They have no primary market; They have no initial price
  - Some have white papers; Some do not
  - They are created via a mining process or they are created by companies (like in ICO) but they are distributed out for free via airdrop process
    - **Mining:** The process of creating digital tokens via transaction verification process (usually involves solving mathematical problems)
    - **Airdrop:** The process of giving out digital tokens for free to certain groups of people — usually with existing wallets

* Some ICO tokens (but not that many) are also mineable.

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What were their intended properties?

- **Payment Tools —** "Payment Tokens" or "Cryptocurrencies"

- **Tokens that can be exchange for specific products/services in the future —** "Utility Tokens"

- **Security (Debt or equity claims against the issuers) —** "Asset Tokens" or "Security Tokens"

How are they actually currently used/treated?

- **Payment Tools —** Bitcoin, Ethereum
  - Some may also consider Ripple (XRP), Stellar, Bitcoin Cash, Ethereum Classic, Litecoin as payment tools
  - Some may also consider Fiat-Collateralized Stablecoins such as Tether, TrueUSD, Gemini Dollar, USD Coin as payment tools (Other types of Stablecoins may also be considered payment tools.)
- **Tokens that can be exchange for specific products/services in the future**
  - There are many of them: Bancor, Basic Attention Token, FoldingCoin, Golem
  - Actually most of the digital tokens would be considered utility tokens
- **Security (Debt or equity claims against the issuers)**
  - Some tokens were deemed "security" by US SEC such as DAO (no longer exist), Paragon Coin, AirToken
  - Some STOs have recently been issued (tZero, Provenance, etc.) but we do not have their price series data (on secondary markets)

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| Criteria | Creation | Intention | Usage | Behaviors/Properties |

White Papers — Text-Mining Analysis

Payment Tokens/Cryptocurrencies

Bitcoin — Non-ICO

Ethereum — ICO

Ripple (XRP) — Non-ICO

Stellar — ICO

Stablecoins

Fiat-Collateralized

Tether — Non-ICO

Crypto-Collateralized

bitUSD, bitEUR, bitCNY
bitGold, bitSilver, bitBTC — Non-ICO
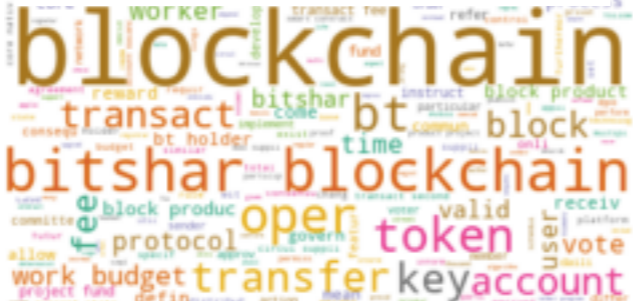
Related token: BitShares

Non-Collateralized

NuBits — Non-ICO

Related token: NuShares

Utility Tokens

Bancor — ICO

Basic Attention Token — ICO

FoldingCoin — Non-ICO

Golem — ICO

Security Token

Paragon — ICO

Text-Mining Analysis shows no clear pattern that can distinguish the tokens among groups

How are they actually currently used/treated in the secondary market?

- **All types are listed side by side (indistinguishable) in the secondary market**
- **People usually buy them for investment (expecting returns)**

Source: coinmarketcap.com

#	Name	Market Cap	Price	Volume (24h)	Circulating Supply	Change (24h)	Price Graph (7d)
1	Bitcoin	$207,553,792,924	$11,668.58	$30,653,732,623	17,787,412 BTC	-1.20%	
2	Ethereum	$32,029,438,269	$300.21	$10,269,368,141	106,688,853 ETH	-2.10%	
3	XRP	$17,446,634,808	$0.409867	$1,589,413,726	42,566,596,173 XRP *	-1.40%	
4	Bitcoin Cash	$7,534,444,501	$421.77	$2,148,743,197	17,864,050 BCH	-2.02%	
5	Litecoin	$7,390,019,880	$118.35	$4,155,869,382	62,440,876 LTC	0.37%	
6	EOS	$5,614,797,937	$6.10	$3,072,399,852	921,107,226 EOS *	0.90%	
7	Binance Coin	$4,766,233,908	$33.76	$314,477,403	141,175,490 BNB *	-1.36%	
8	Bitcoin SV	$3,703,403,935	$207.42	$584,819,395	17,854,986 BSV	-3.13%	
9	Tether	$3,583,765,350	$0.995939	$28,357,651,233	3,598,378,341 USDT *	0.48%	

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Cryptocurrencies vs. Stablecoins vs. Security Token vs. Utility Tokens

Daily Price Series
(Normalized; 26 Oct 2017 - 28 Feb 2019)
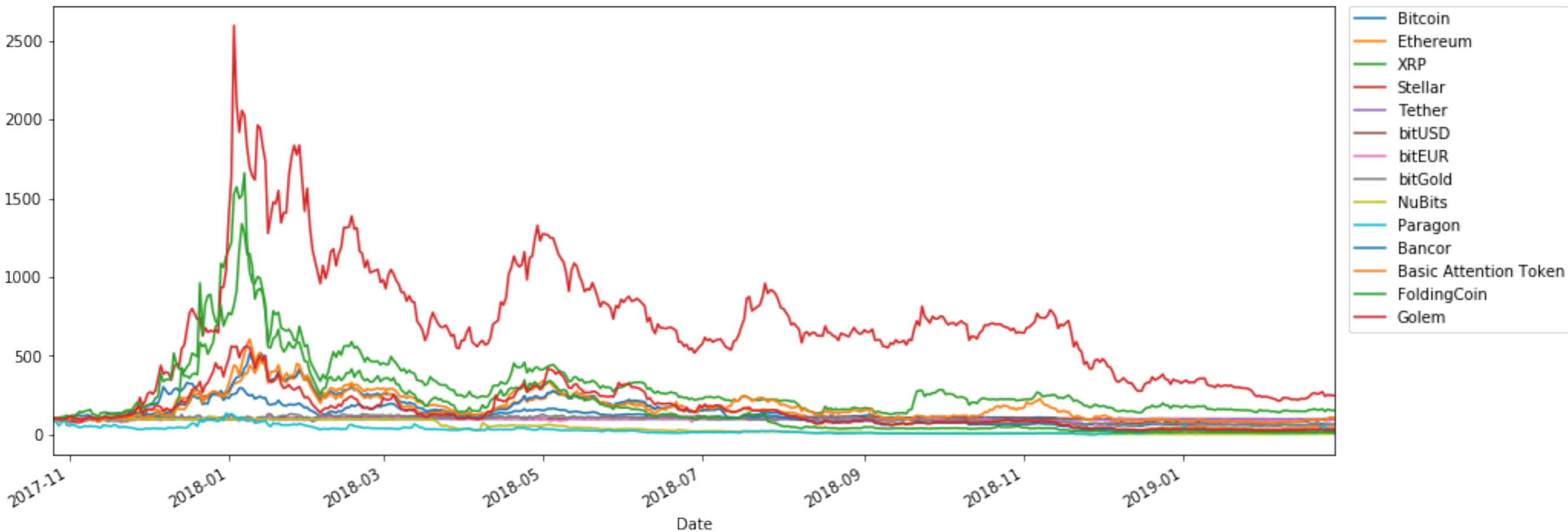
It seems like we can't really distinguish them. However, some tokens have relatively stable price series.

Cryptocurrencies vs. Stablecoins vs. Security Token vs. Utility Tokens

Daily Return Series
(26 Oct 2017 - 28 Feb 2019)
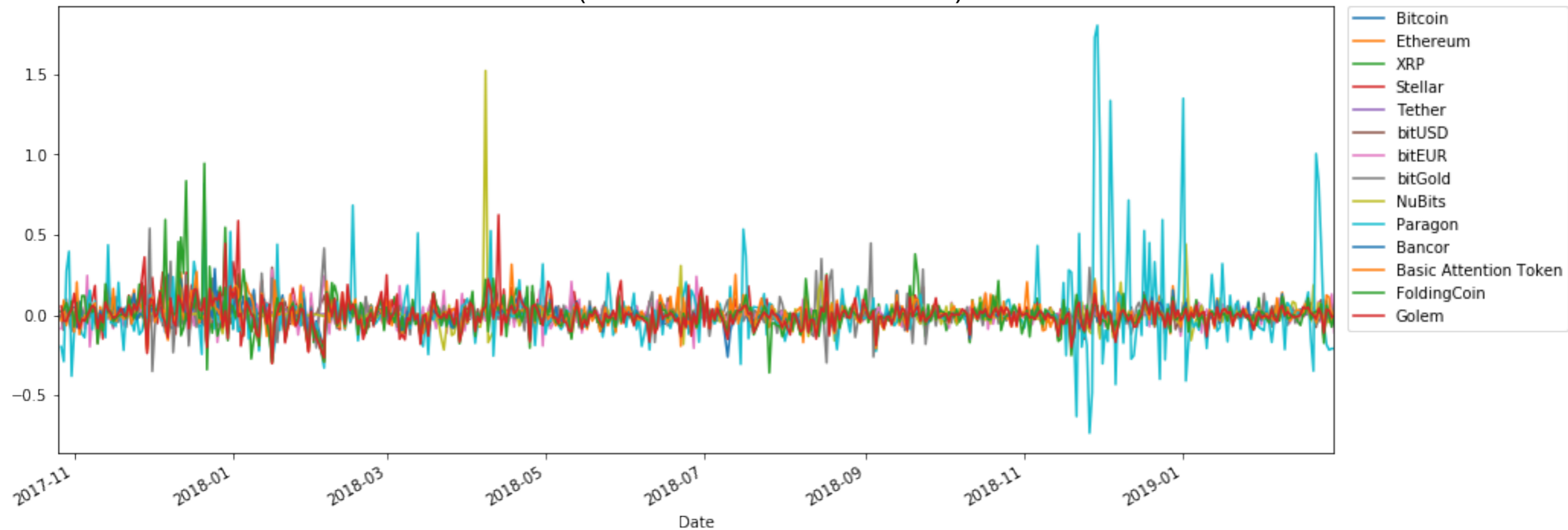
It seems like daily returns series for Paragon Coin (Security Token) is more volatile than others

Cryptocurrencies vs. Stablecoins vs. Security Token vs. Utility Tokens

(Data Period: 26 Oct 2017 - 28 Feb 2019)

	Average Price (in USD)	Average Daily Returns	Volatility (Std of Daily Returns)	
Bitcoin	7576.901367	0.000188	0.046410	⎫
Ethereum	436.392731	0.000036	0.057198	⎬ Payment Tokens = Cryptocurrencies
XRP (Ripple)	0.600213	0.004140	0.086168	
Stellar	0.235875	0.004990	0.081355	⎭
Tether	1.002131	0.000046	0.007088	Fiat-Collateralized Stablecoin
bitUSD	0.991699	0.000693	0.040576	⎫
bitEUR	1.255539	0.001530	0.059712	⎬ Crypto-Collateralized Stablecoins
bitGold	1314.078613	0.002556	0.084477	⎭
NuBits*	0.437625	-0.003165	0.092081	Non-Collateralized Stablecoin
Paragon	0.193160	0.016350	0.226177	Security Token
Bancor	2.672426	-0.000862	0.060689	⎫
Basic Attention Token	0.257159	0.003389	0.079824	⎬ Utility Tokens
FoldingCoin	0.013298	0.000178	0.096618	
Golem	0.294979	0.000911	0.080928	⎭

- **Tether (Fiat-Collateralized Stablecoin) has the lowest volatility**
- **Pargon Coin (Security Token) has the highest avg. return and the highest volatility**

* NuBits was able to hold its value at 1 USD for quite some time but now the peg has already been broken.

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Example: For other asset classes — clustering by the similarities of their return series* can reveal the different classes

Visualization of pearson correlation distance of selected assets (during 2016-2018)
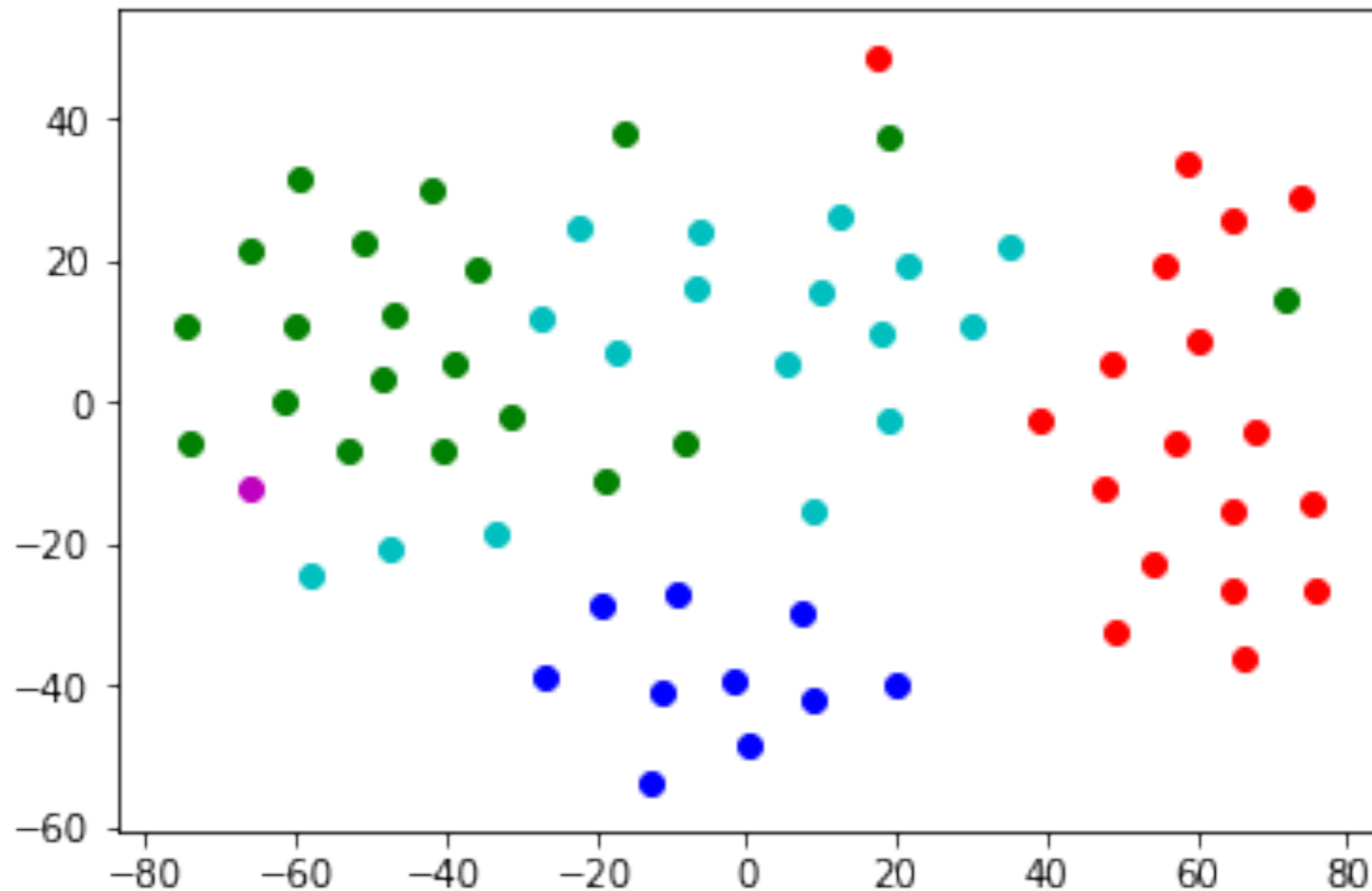
- **Bonds** (red)
- **Currencies** (green)
- **Equities** (cyan)
- **Digital Tokens** (blue)
- **Precious Metals** (purple)

* Monthly returns
Note on correlation distance: https://www.datanovia.com/en/lessons/clustering-distance-measures/

Clustering by Similarities of Digital Token Return Series*

Visualization of pearson correlation distance of ICO tokens vs. non-ICO tokens
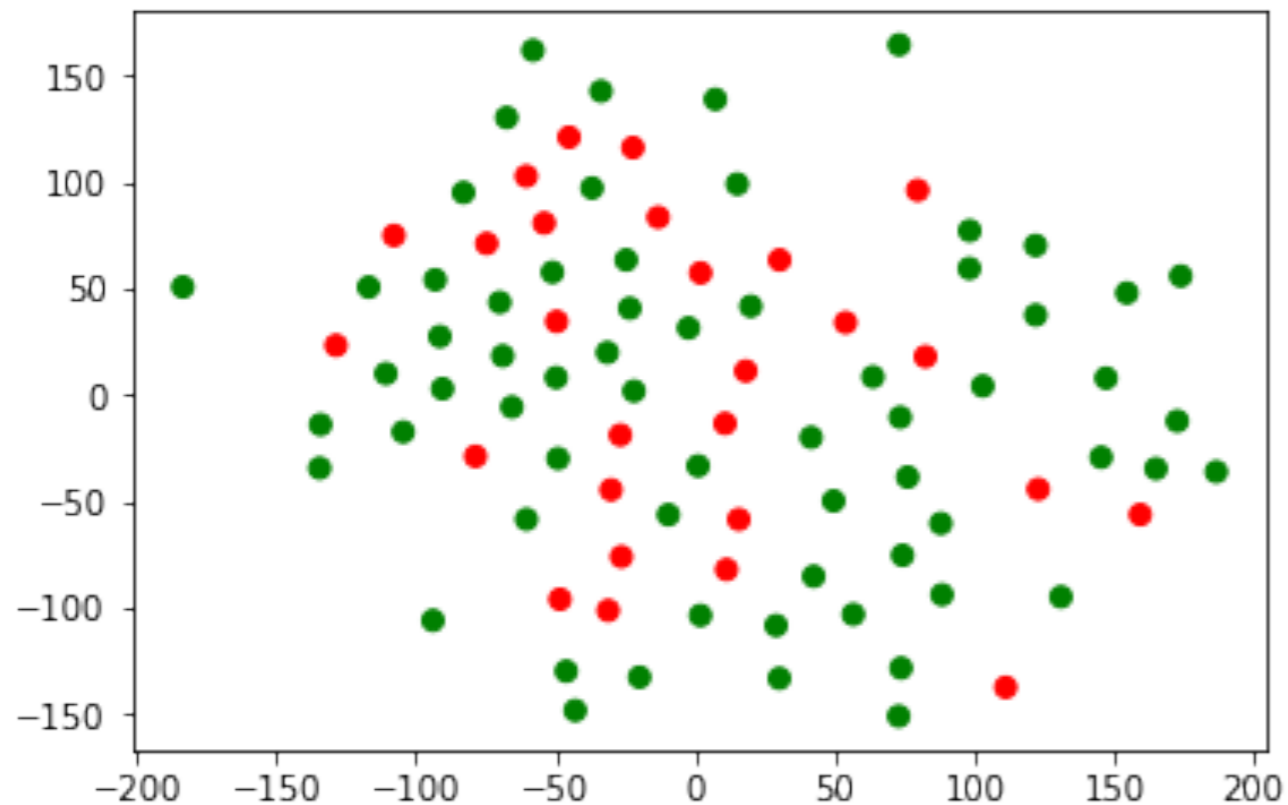
(Price data during Mar 2017 - Feb 2019)   (Price data during Mar 2018 - Feb 2019)
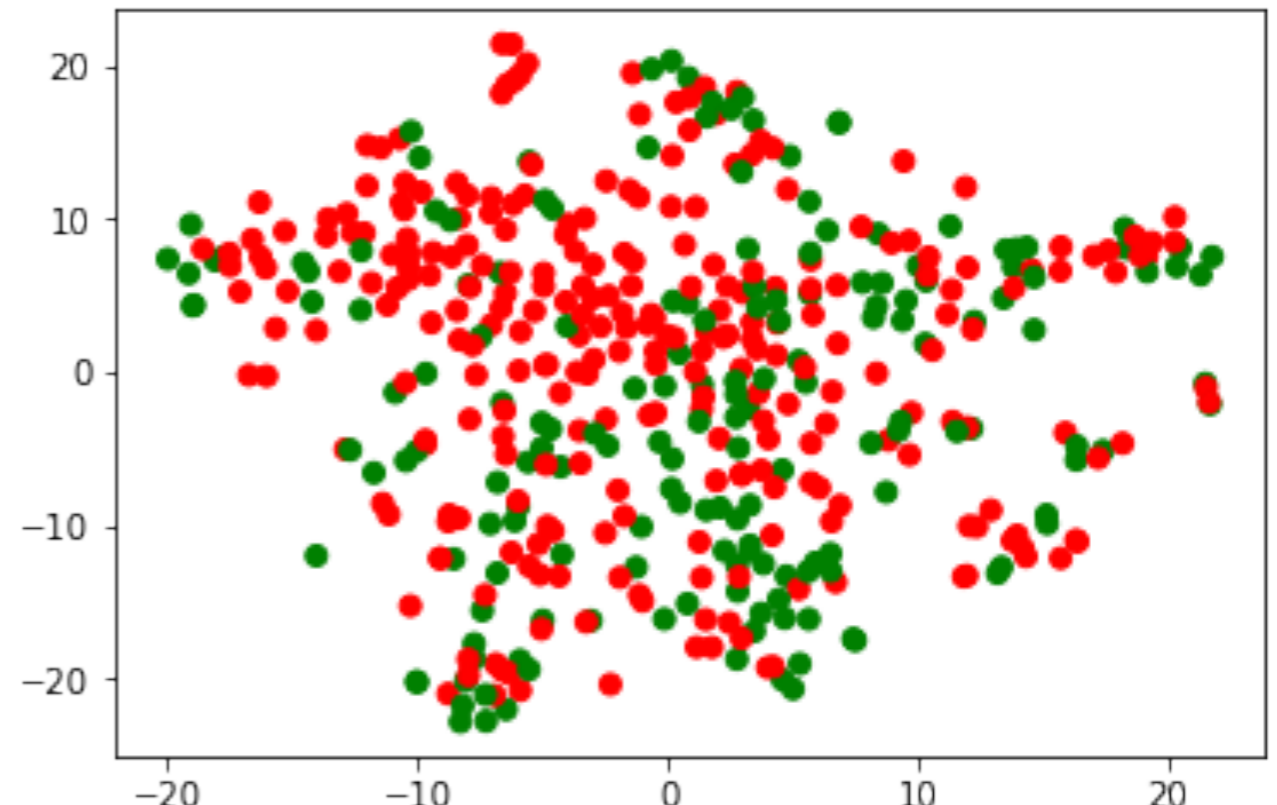
• **ICO Tokens**   • **Non-ICO Tokens**

The clustering does not really work for digital tokens

* Monthly returns
Note on correlation distance: https://www.datanovia.com/en/lessons/clustering-distance-measures/

Clustering by Similarities of Digital Token Return Series*

Visualization of pearson correlation distance of digital tokens (6 groups)
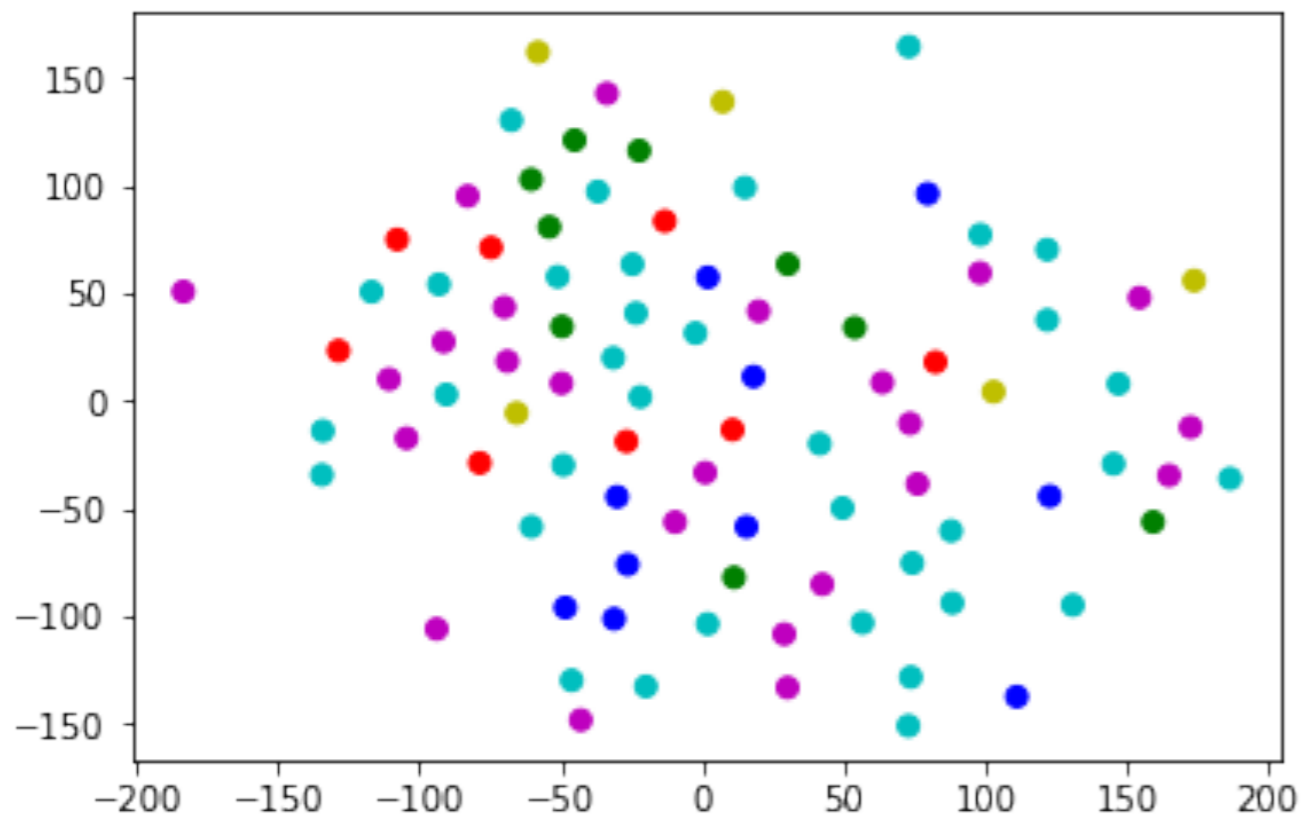
(Price data during Mar 2017 - Feb 2019)   (Price data during Mar 2018 - Feb 2019)
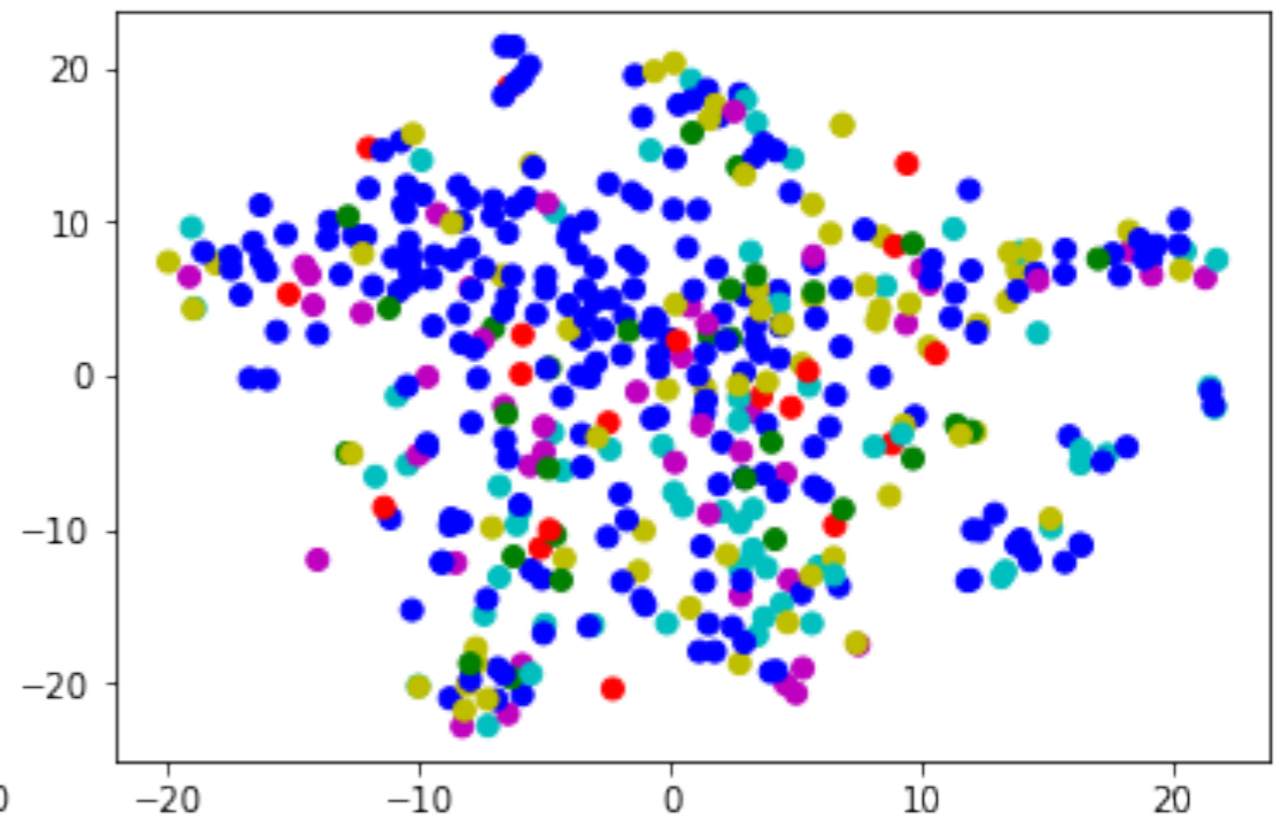
- **Group 1: ICO/Native/Mineable**
- **Group 2: ICO/Native/Non-Mineable**
- **Group 3: ICO/Non-Native**

- **Group 4: Non-ICO/Native/Mineable**
- **Group 5: Non-ICO/Native/Non-Mineable**
- **Group 6: Non-ICO/Non-Native**

The clustering does not really work for digital tokens

* Monthly returns
Note on correlation distance: https://www.datanovia.com/en/lessons/clustering-distance-measures/

Findings: Do they belong to the same asset class?

- **Creation** — Distinguishable
- **Intention** — Distinguishable
- **Actual usage**
  - **Usage** — Distinguishable in some aspects
  - **Secondary Market** — Indistinguishable
- **Behaviors/properties** — Indistinguishable for most cases but we observed that:
  - Tether (Fiat-Collateralized Stablecoin) has the lowest volatility
  - Paragon Coin (Security Token) has the highest avg. return and the highest volatility

Conclusion and Policy Implications

- Although the digital tokens are indistinguishable in the secondary markets, they were created differently with different intention.

- We also have some evidence that some of them have distinguishable risk and return profiles.

- Therefore, we take a view that they take different roles in the financial system and should be subject to different sets of regulations (although some may overlap) and perhaps different regulators should be in charge.
  - The ones that are close to "security" should be govern by security-related regulations/regulators
  - The ones that are close to "money" should be govern by money-related regulations/regulators
  - The ones that are in between should be govern by both sets of regulations/regulators

- Or perhaps we should set up a new regulator that oversees of all types of digital tokens and acknowledge the differences among them.

- Limitation & Future Research
  - Limited samples of Security Token (STO is still in early stage) and Stablecoins
  - Need longer-period data
    - The digital token market just went through a bubble (2017-2018)
    - Many digital tokens were recently created since 2017 onwards

Thank you

Appendix:

512 Digital Tokens
(that have white papers)
by groups

1
ICO
Native
Mineable

2
ICO
Native
Non-Mineable

3
ICO
Non-Native*

ICO Native Mineable

Aion
ATBCoin
Auroracoin
Breakout
Bytecoin
Bytom
Cardano
Elastos
Ethereum
Filecoin [Futures]
GoByte
Hush
Komodo
MinexCoin
NULS
Quantum Resistant Ledger
Siacoin
Syscoin
TRON
Verge

ICO Native Non-Mineable

AdShares
Aeternity
Ark
ChatCoin
Counterparty
CyberMiles
EOS
Factom
HEAT
ICON
IOTA
Lisk
Lykke
Neblio
Nebulas
NEO
Obsidian
Omni
Particl
Peerplays
Qtum
SophiaTX
Sphere
Stellar
Stratis
Tezos
Travelflex
Wagerr
Waves
Zeepin

ICO Non-Native*

Genaro Network*	Bluzelle	district0x	Indorse Token	OmiseGO	Selfkey	Universa
0x	Bonpay	DomRaider	Ink	Opus	SingularDTV	Upfiring
ACE (TokenStars)	Bottos	Dovu	Ink Protocol	OriginTrail	SingularityNET	Uquid Coin
adbank	Bounty0x	Dragonchain	Internet Node Token	Ormeus Coin	SIRIN LABS Token	UTRUST
AdEx	Bread	Edgeless	Internxt	Paragon	SkinCoin	Verify
aelf	CanYaCoin	Eidoo	IoT Chain	PARETO Rewards	SmartMesh	Vezt
Aeron	Cappasity	EncrypGen	Iungo	Patientory	Sociall	Viberate
Agrello	carVertical	EncryptoTel [ETH]	Jibrel Network	Payfair	Soma	Voise
AidCoin	CFun	EncryptoTel [WAVES]	Karma	PayPie	SONM	Waltonchain
Aigang	Chainlink	Enigma	KickCoin	Pillar	Speed Mining Service	WandX
AirSwap	Change	Enjin Coin	Kin	Playkey	SportyCo	WAX
ALIS	Chronobank	Envion	Kyber Network	Pluton	Starbase	WePower
Alphacat	Chronologic	Etheroll	Lamden	Po.et	Status	WeTrust
Ambrosus	ClearPoll	Etherparty	Lampix	Polybius	STK	Wings
AppCoins	Cobinhood	ETHLend	Leverj	Polymath	Storj	Worldcore
Aragon	Coinlancer	Ethorse	LOCIcoin	Populous	Storm	Xaurum
Arcblock	CoinMeet	Ethos	LockTrip	Power Ledger	Stox	YOYOW
ATLANT	COMSA [ETH]	Everex	Looping	Presearch	Streamr DATAcoin	Zap
ATN	COMSA [XEM]	Exchange Union	Lunyr	PressOne	Substratum	Zilliqa
Augur	COPYTRACK	FidentiaX	Lympo	Primalbase Token	SunContract	ZrCoin
Aurora DAO	COSS	Flixxo	MaidSafeCoin	Primas	SureRemit	
Aventus	Covesting	FlypMe	Maker	Privatix	Suretly	
aXpire	CPChain	Fortuna	Matchpool	Propy	SwissBorg	
Bancor	Credo	FunFair	Matryx	Pylon Network	TaaS	
BANKEX	Crypterium	Fusion	MediBloc [QRC20]	QASH	Target Coin	
Basic Attention Token	CRYPTO20	Genesis Vision	Medicalchain	Qbao	Telcoin	
Bezop	Cryptopay	Gifto	Melon	QLC Chain	TenX	
Bibox Token	CryptoPing	Gnosis	Metal	Quantstamp	THEKEY	
Binance Coin	DADI	Golem	MobileGo	Raiden Network Token	THETA	
BitClave	DAO.Casino	Grid+	Modum	RChain	Tierion	
BitDegree	Darcrus	HEROcoin	Monetha	REAL	Ties.DB	
bitJob	DATA	Hubii Network	Monster Byte	Refereum	Time New Bank	
Blackmoon	Datawallet	Humaniq	MyBit	RefToken	Tokenbox	
Block Array	Datum	Iconomi	Mysterium	Remme	TokenCard	
BlockCAT	Decentraland	iExec RLC	MyWish	Request	Tokes	
BlockMason Credit Protocol	DeepBrain Chain	Ignis	NAGA	Restart Energy MWAT	TopChain	
Blockport	Dent	IHT Real Estate Protocol	Nucleus Vision	Ripio Credit Network	Trinity Network Credit	
BLOCKv	Dentacoin	imbrex	OAX	Rivetz	TrueFlip	
Bloom	Devery	indaHash	Odyssey	SALT	Unikoin Gold	
	DigixDAO		Olympus Labs	Santiment Network Token	United Traders Token	

Source: Created by the authors based on the information from coinmarketcap.com and icorating.com/ico/all/

4 — Non-ICO Native Mineable

2GIVE	Internet of People
AdCoin	Lethean
Advanced Internet Blocks	Linda
Adzcoin	Litecoin Cash
Aeon	Megacoin
ALQO	Monero
ArtByte	Monoeci
AudioCoin	Motocoin
BiblePay	Musicoin
Bitcoin	Nexus
BitcoinZ	PACcoin
Bitmark	Pascal Coin
BitWhite	Pesetacoin
Bulwark	Polis
Burst	PopularCoin
Cryptonite	PotCoin
Dash	Pura
Decred	PutinCoin
DeepOnion	PWR Coin
Denarius	Rupee
Diamond	Skeincoin
DigitalNote	SmartCash
Dimecoin	Stealth
Dogecoin	Sumokoin
Electra	SuperCoin
Espers	Terracoin
Experience Points	TeslaCoin
FLO	ToaCoin
Galactrum	TrezarCoin
GCN Coin	United Bitcoin
GoldCoin	VeriCoin
GridCoin	VeriumReserve
Gulden	Vertcoin
HempCoin	Vsync
HiCoin	WINCOIN
Horizen	Zcash
HTMLCOIN	ZClassic
HyperCash	Zcoin

5 — Non-ICO Native Non-Mineable

Achain	PRIZM
Aidos Kuneen	Radium
Ardor	ReddCoin
Asch	Rupaya
Atmos	SaluS
BitBay	SelfSell
Bitcloud	Shekel
BitShares	Shift
BlackCoin	Solaris
Breakout Stake	Steem
CasinoCoin	TittieCoin
CloakCoin	W3Coin
CryptoCarbon	XEL
DigitalPrice	XRP
DopeCoin	XTRABYTES
FairCoin	
Flash	
Global Cryptocurrency	
GXChain	
High Performance Blockchain	
I/O Coin	
ION	
LEOcoin	
LiteDoge	
Manna	
MOAC	
Nano	
NavCoin	
NEM	
NoLimitCoin	
NuBits	
Nxt	
Opal	
PeepCoin	
Phore	
PIVX	
POA Network	
PoSW Coin	

6 — Non-ICO Non-Native**

Acute Angle Cloud	OneRoot Network
adToken	Open Trading Network
AI Doctor	OracleChain
AICHAIN	OST
All Sports	Paypex
ATMChain	PiplCoin
Autonio	ProChain
Bela	Profile Utility Token
bitqy	QunQun
Blue Protocol	Qwark
Bodhi	REBL
Creditbit	Ren
Crypto.com	Ruff
Dai	Safe Exchange Coin
Databits	Shadow Token
Delphy	Sharechain
Dynamic Trading Rights	Soarcoin
EchoLink	SpaceChain
Energo	SpankChain
Equal	Swarm City
FoldingCoin	Tether
GET Protocol	Tigereum
Global Awards Token	TokenClub
Hiveterminal Token	TrueChain
IDEX Membership	ugChain
InvestDigital	UNIVERSAL CASH
IOST	UnlimitedIP
IPChain	Veros
Kcash	VIBE
Kolion	VouchForMe
KuCoin Shares	Waves Community Token
LightChain	WavesGo
LinkEye	Xenon
Matrix AI Network	XPA
Maverick Chain	YEE
Mixin	Zeusshield
Molecular Future	
Numeraire	
NuShares	

Source: Created by the authors based on the information from coinmarketcap.com and icorating.com/ico/all/

ICO	Native	Mineable	
0	0	0	75
	1	0	53
		1	76
1	0	0	257
		1	1
	1	0	30
		1	20