



Monitoring digital token markets: An early look at frameworks and techniques

MAS

27 Nov 2018

Moses Soh



Key questions

How exposed are our financial institutions to digital tokens?

How much digital token exposure do Singaporeans have?

How much could people stand to lose?

Which are the main wallet providers and trading platforms in Singapore?

How much money has been put into them?

Who are their main counterparties?

How large are such cross-border flows in digital token markets?

What do we know about ICOs in Singapore?



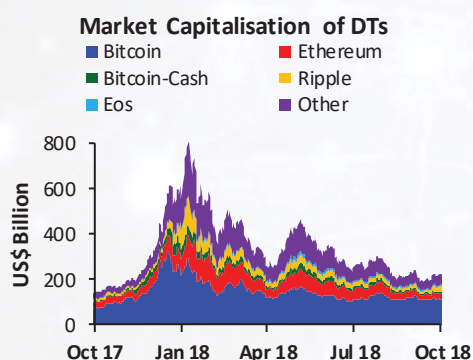
Overview

- Recent developments in digital token markets
- Bridging data gaps in digital token markets
 - Global trading platforms: Using trading platform APIs to understand global digital token trading activity
 - Trading platforms in Singapore: Using trading platform APIs to better understand Bitcoin trading activity in Singapore, and potential financial stability implications
 - Blockchain-based techniques to understand activity of unregulated entities
 - Online ICO portals to understand global and Singapore activity

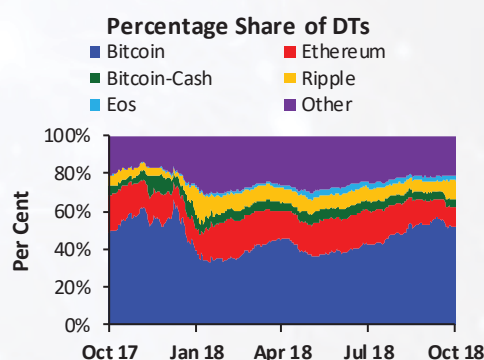


Rapid developments in digital token markets warrant close monitoring

- While digital token valuations have fallen substantially since Jan 2018, the space continues to change rapidly and bears close monitoring to identify emerging developments (e.g. increased integration with financial institutions, further evolution of blockchain technology).
- Bitcoin remains substantially bigger than other digital tokens, with other alt-coins such as Ethereum and Ripple making up smaller albeit still significant shares.



Source: CoinMarketCap



Source: CoinMarketCap



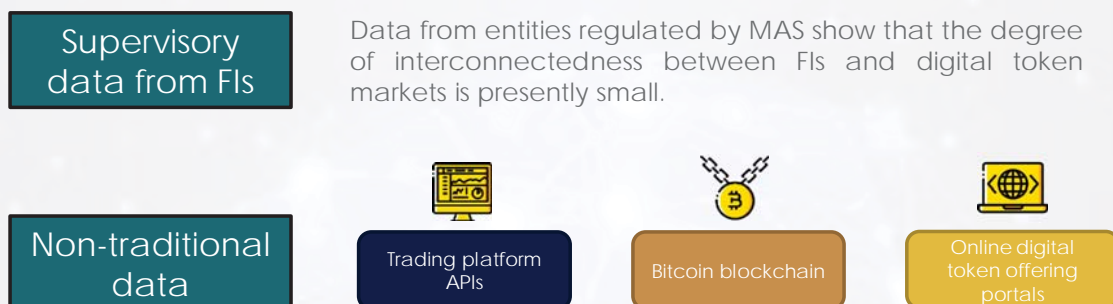
Data on digital token markets is not readily available from conventional channels

- Monitoring developments has proven to be a challenge because data is not available from conventional sources, and because of the anonymity and decentralised nature of the tokens.
- The emergence of a digital token ecosystem that could fall outside regulators' ambits calls for novel techniques and data sources to monitor digital tokens.



MAS' monitoring approach

- We have developed a set of real-time indicators and data sources to identify emerging financial stability concerns from digital tokens in a timely manner.



The techniques and data sources used are relevant to the various ways that digital tokens affect our work as a regulator, be it from financial stability to consumer protection and anti-money laundering.



Bridging data gaps in digital token markets

 RESTRICTED

Bridging data gaps in digital token markets

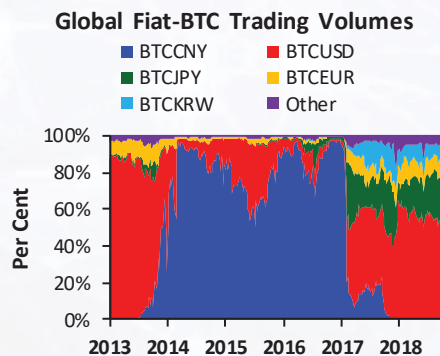
Regulated FIs
Trading Platform APIs

 RESTRICTED

Data from trading platform APIs provide a useful view of global digital token activity...

Trading Platform APIs

- Data from digital token trading platform Application Programming Interfaces (APIs) allows monitoring of global shifts in trading activity.
- **We track 100+ trading platforms based in various jurisdictions globally.** This is done through aggregator APIs, and by connecting to the individual APIs themselves where necessary.



Source: MAS estimates, Trading platform APIs
Note: Trading volumes are USD denominated.

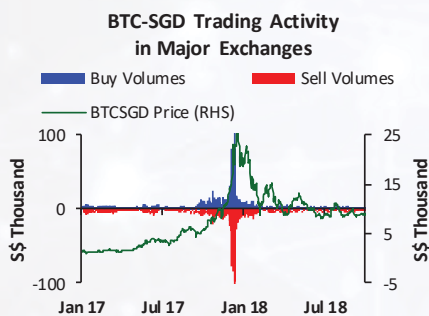


Slide 9 of 23

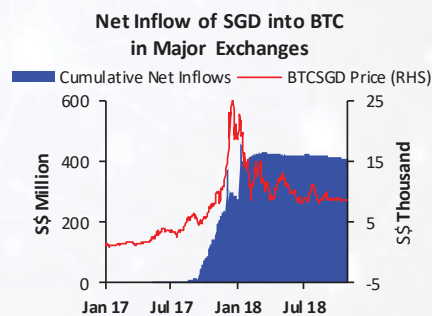
...and facilitate deeper dives into the size of wealth effects in specific jurisdictions

Trading Platform APIs

- MAS used the trading activity and inflows of SGD into BTC-SGD trades on major Singapore-based exchanges as proxies for the potential wealth effects and associated risks in Singapore.
- **Analysis suggests that wealth effects in Singapore are presently small.**



Source: MAS estimates, Trading platform APIs



Source: MAS estimates, Trading platform APIs



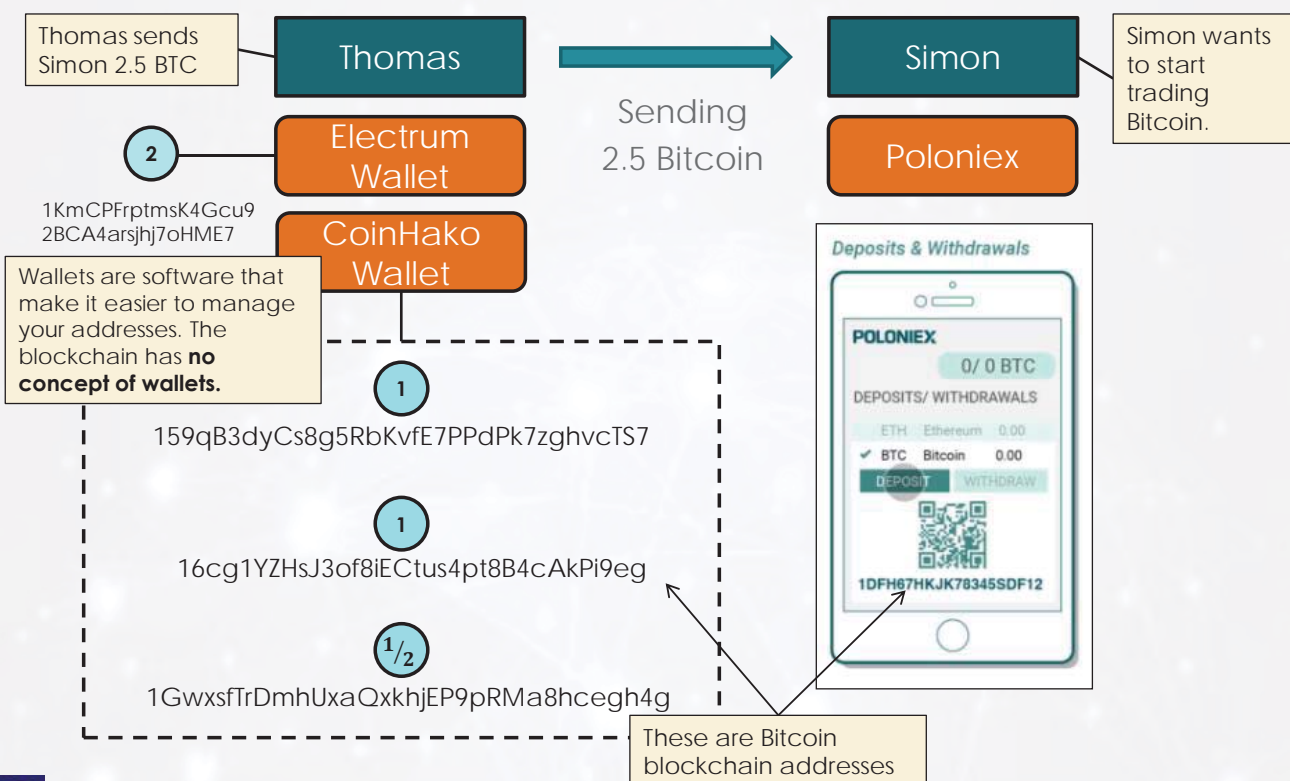
Slide 10 of 23

Bridging data gaps in digital token markets

Regulated FIs
Trading Platform APIs
Bitcoin Blockchain

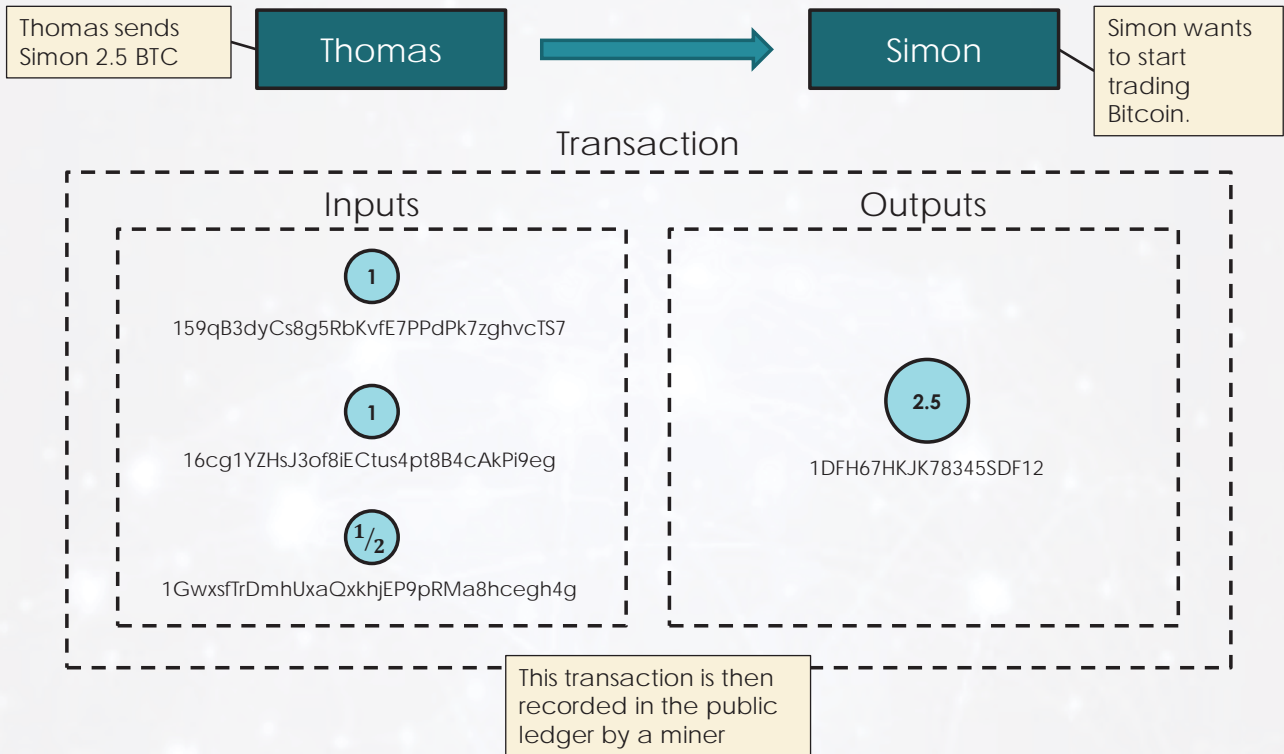
MAS RESTRICTED

Blockchain Fundamentals – How does it work?

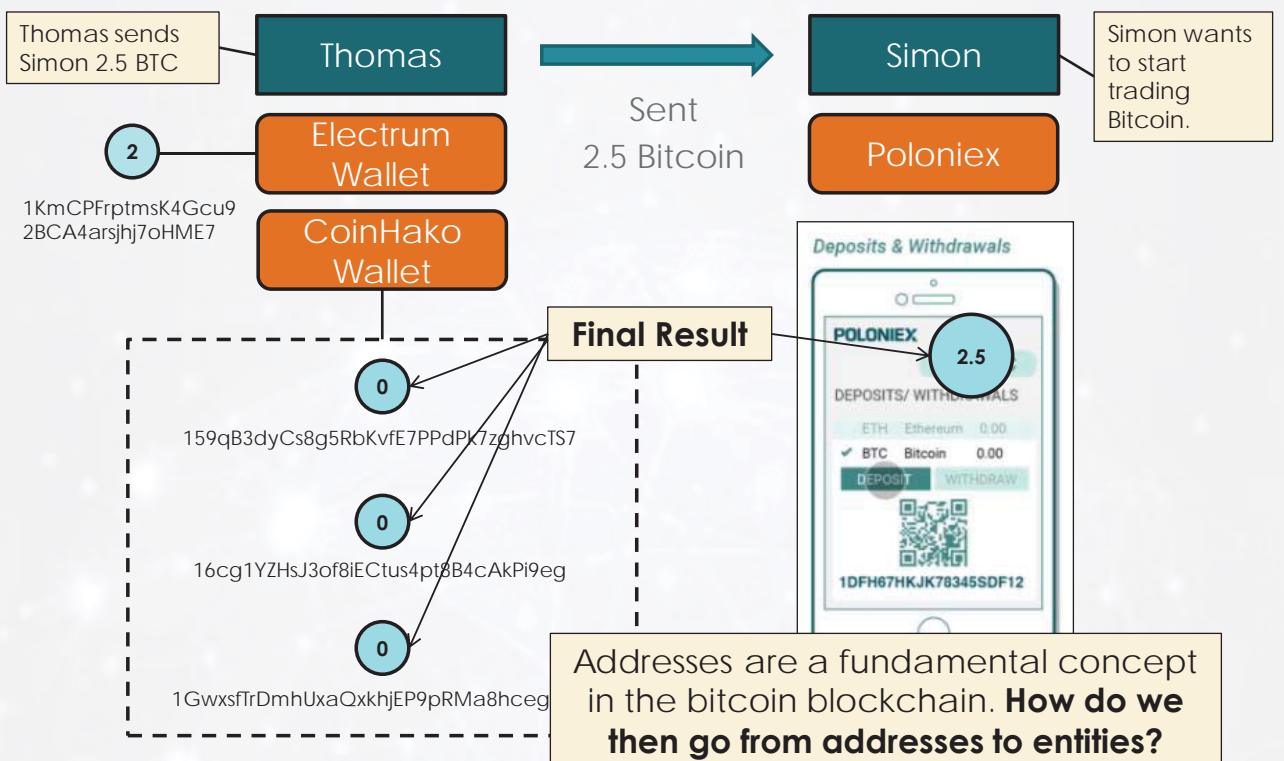


MAS

Blockchain Fundamentals (cont'd)



Blockchain Fundamentals (cont'd)



Clustering on the Blockchain can help us track the activity of digital token entities...

Blockchain Analytics

- There are several digital token broker dealers without an API. How can we monitor their relative size and flows?
- **Clustering:** Identify addresses that belong to an entity, and monitor balances and flows in and out of those addresses



Slide 15 of 23

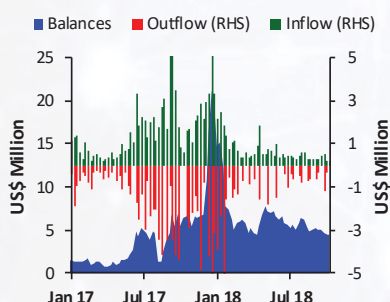
...by sharpening our visibility of digital token entities' scale and counterparties

(Case Study of Singapore Broker-Dealer)

Blockchain Analytics

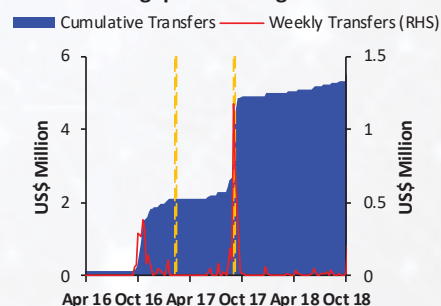
- We can estimate size of potential custodial holdings and flows it may be intermediating.
- Early analysis on the flow of funds from a key trading platform in an overseas jurisdiction to a Singapore trading platform suggests that while regulatory actions may be drivers of cross-border crypto flows, the magnitude of such flows remains small.

Blockchain Monitoring of Major Singapore-based Wallet Provider



Source: MAS estimates, Bitcoin Blockchain

Transfers of BTC from a Key Trading Platform to a Singapore Trading Platform



Source: MAS estimates, Bitcoin Blockchain



Slide 16 of 23

Bridging data gaps in digital token markets

Regulated FIs
 Trading Platform APIs
 Bitcoin Blockchain
 ICO Online Portals



ICO listing portals can provide information on the country of operations of various ICOs

- **Source:** Self-reported data from ICO rating portals.
- **Data quality:** Further work needed to (i) clean the data, and (ii) develop a variety of data sources.



Terms of references vary across portals and are ill-defined. "Country" could refer to (i) country of operations or (ii) domicile of offering vehicle, and the offering may or may not have been made in that country.

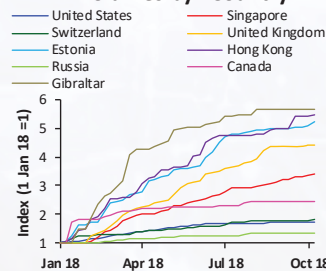


Public data can give a preliminary sense of digital token offerings

Online Digital Token Offering Portals

- The prevalence of digital token offerings underscores the rapid changes taking place in digital token markets, and the growing need for better surveillance in this area.
- Further work is needed to address data quality limitations¹, but MAS' early work on using information from online portals allows regulators to gain a preliminary sense of digital token offerings activity globally.

Self-reported Digital Token Offering Volumes by "Country"



Source: MAS estimates, online digital token offering portals
 Note: Country is based on digital token offering's self-reported "country of operations".

¹ One major caveat on this approach, is that the data has been self-reported by token issuers to online portals, and not verified. Terms of references vary across portals and are ill-defined e.g. "country" could refer to (i) country of operations or (ii) domicile of offering vehicle, and the offering may or may not have been made in that country.

Visualising Singapore ICO descriptions

Online Digital Token Offering Portals

- We used natural language processing to extract out topics and entities from ICO descriptions. These were weighted by their relevance to the descriptions, and the confidence that the model during extraction.
- Unfortunately, data was noisy and no clear patterns in descriptions of ICOs...but we did pick up a slight anti-establishment vibe with references to the financial crisis.



Bridging data gaps in digital token markets

Regulated FIs
Trading Platform APIs
Bitcoin Blockchain
ICO Online Portals



RESTRICTED

Key takeaways

- Large amounts of non-traditional data to be tapped – thus far mostly unexplored amongst regulatory authorities.
- Analysis and data sources can also be potentially applicable beyond financial stability (e.g. consumer issues, AML).
- Further work to be explored:
 - Blockchain research: Exploring further applications of blockchain-based research (e.g. for stablecoins)
 - ICOs: Exploring additional data sources (e.g. Telegram groups) and analytical methods to build a fuller picture of ICO activity



Thank You



RESTRICTED