

Central Bank in the world of Digital Economy:

Crypto-currencies and effectiveness of Monetary Policy

Prof. Dr. Miranda S Goeltom
University of Indonesia

CIFA Conference
Monaco, 22 May 2018

Data was Partly taken from a presentation by Dr. Perry Wardjijo
Deputy Governor of Bank Indonesia

Contents

- I. Potential gains and disruptive effect of Digital Economy
- II. Indonesia and the rise of digital economy
- III. Virtual Currency and effectiveness of Monetary Policy
- IV. Indonesian Policy Responses
- V. Conclusion

02

I. Potential gains and disruptive effect of Digital Economy

Real Economy

- ❑ Potential to bring large productivity gains.
- ❑ Erosion of cost advantage of EMEs in low-tech manufacturing.
- ❑ Disruptions for EMEs that rely on industrialization.
- ❑ This will have big effects on skills demand, the structure of employment and labor market functioning.

Central Bank

- ❑ Lower cost for printing money
- ❑ Crypto-currency
- ❑ Blockchain / Distributed Ledger Technology (DLT)



Industry Revolution 4.0

Financial Services

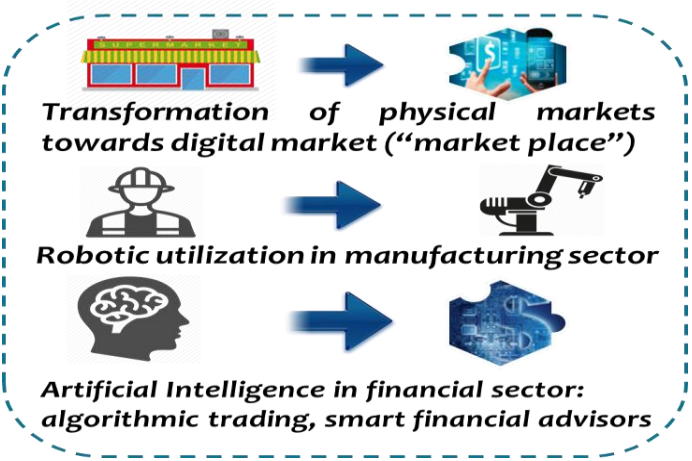
- ❑ Faster, simpler, cost-saving retail services
- ❑ Emerging competition with traditional financial institutions, particularly banks

Cross Border Transactions

- ❑ Increase Cross border trade and investment
- ❑ Cross border financial services: technology utilization reduces entry barrier
- ❑ More immediate and swift spillovers across countries

TECHNOLOGY: POTENTIAL GAINS AND DISRUPTIVE EFFECT

Changes on How Real Economy Works



Benefits

- Efficiency increase
- Cost reduction
- More opportunities for SMEs
- Closer distribution of SME products
- Accelerators of market movement

Risks

- Disruption to formal markets, both retail and wholesale
- Unemployment, especially in Advanced Economies

Strategy

- ✓ National champions in digital economy
- ✓ Re-skilling of impacted labor

Changes on How Financial Services Function



- Changes in landscape of financial system
- Widespread digital providers: faster, simpler, cost-saving retail services
- Emerging competition with traditional financial institutions, particularly banks

Benefits

- Increase efficiency
- Supporting economy
- Financial inclusion
- Accelerators of market movement

Risks

- New threats to established FIs
- Cyber risks
- Procyclicality
- Regulatory arbitrage
- Contagion risks

Strategy

- ✓ Support digital companies to flourish
→ (big data, API, QR code & cloud)
- ✓ Payment system and macroprudential supervision
- ✓ Encourage fintech providers to collaborate with traditional FIs
→ preventing excessive shadow banking

TECHNOLOGY: POTENTIAL GAINS AND DISRUPTIVE EFFECT



Changes on How Central Banks Operate



Threat of crypto-currency:

1. Private sector initiative: technology to create virtual money
2. Very volatile, inducing intent speculation



Blockchain & Distributed Ledger Technology (DLT)



Implications

- ✓ Undermining existence of fiat money and central banks
- ✓ Possibilities of future changes in CBs' operation: (i) definition of money, (ii) monetary policy transmission, (iii) effectiveness of CB policies



Strategy

- Central bank should develop Central Bank Digital Currency (CBDC)
- ✓ Central banks and IMF are still developing best framework of CBDC to bring trust, interoperability, and stability.



Changes on How Cross-Border Transactions Flow



1. Cross-border trade and investment:

- ✓ More challenging to guard boundaries: Customs, FDIs
- ✓ More pressures on capital inflows: targeting direct retails
- ✓ Trading-off: improved cross border trade and investment vs. disrupted labor market



2. Cross border financial services: technology utilization opening more markets

- ✓ Balancing between market access grant and protection
- ✓ Racing between technology and regulation



3. More immediate and swift spillovers across countries

Will this be the origin of the next crisis?



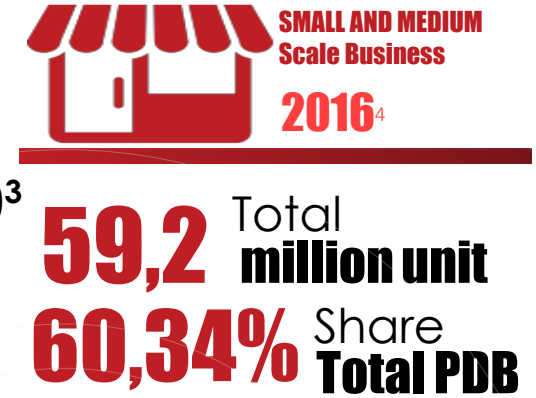
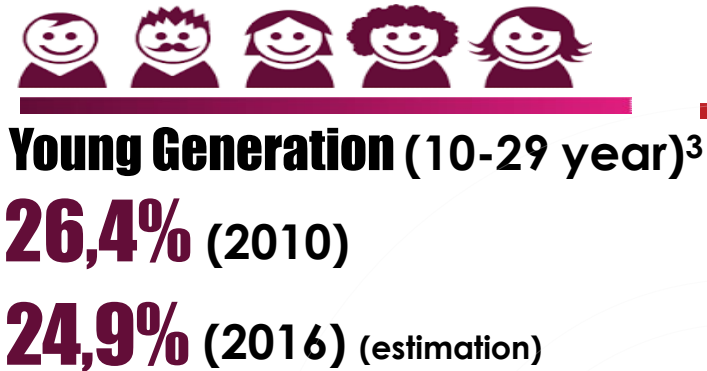
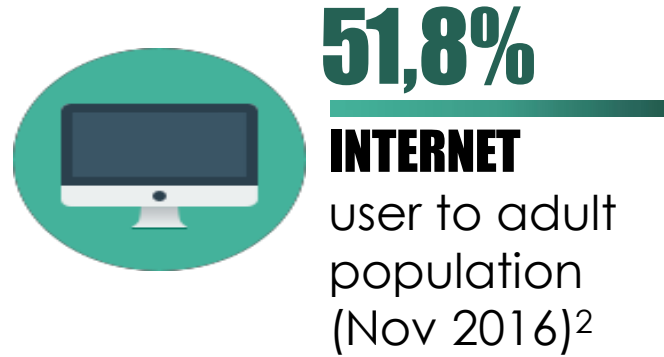
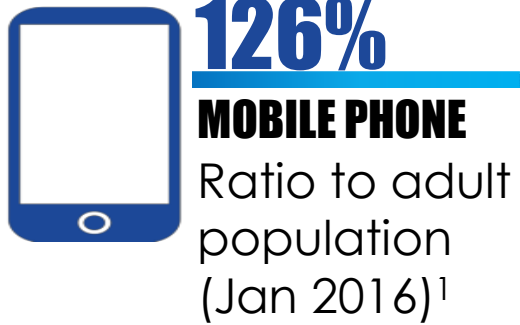
Strategy

- Improving domestic and regional resilience
- cyber resilience
 - financial resilience


II. Indonesia and the rise of Financial Technology

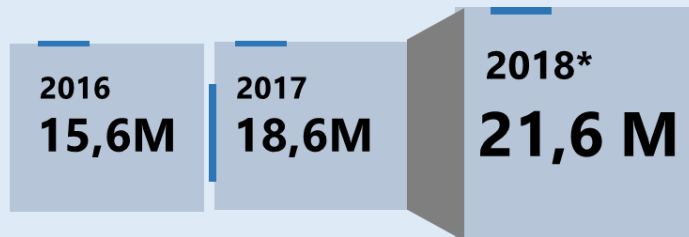
Indonesia: The Rise of Financial Technology

Potential growth of digital economy consistence with the development of mobile phone and internet user as well as young generation..

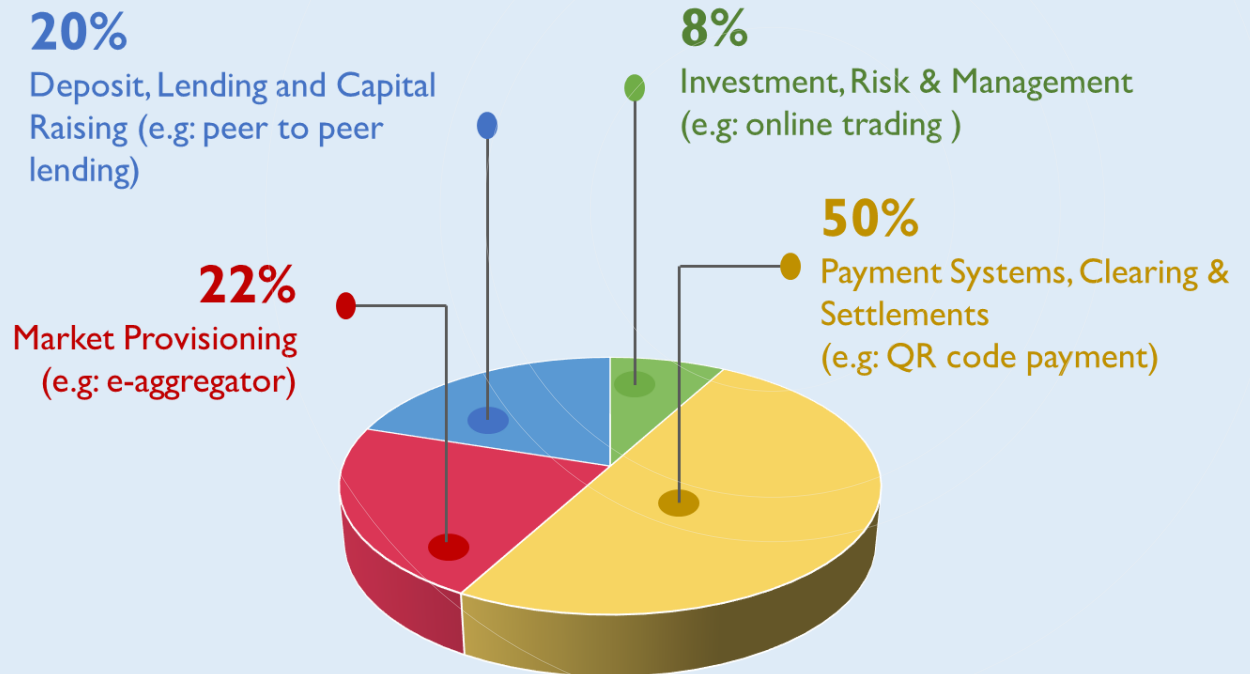


Online Transaction

 **Transaction Value (USD) (20% - yoy)**



 **Number of Fintech Startups (34% - yoy)**



Indonesia: New Players Are Coming and Growing



	GOJEK	traveloka	tokopedia	Bukalapak
LINE OF BUSINES	Ride-hailing service (transportation, logistics, etc) USD1.75 Billion ^{*)}	Online travel & tourist industry USD500 Million ^{*)}	Ecommerce, Billing Service Providers,.. USD1.347 Billion ^{*)}	Ecommerce > USD1 Billion ^{*)}
COMPANY VALUATION^{*)}	Rp 40 Trillion (eq. USD 2.9 Billion)	Rp 26 Trillion (eq. USD 1.9 billion)	Rp 50 Trillion (eq.USD 3.6 billion)	Rp 15 Trillion (eq. USD 1.1 Billion)
MERCHANT ACCEPTANCE	654.000 drivers (497.000 two-wheels, 157.000 four-wheels, 95.000 merchants)	N/A	± 2 million merchants	• ± 1 million merchants
BENEFITS FOR THE ECONOMY	<ul style="list-style-type: none"> Supply chain efficiency in retail trade (applying apps that connect food, groceries, and personal services delivery) Job Creation/informal sectors Logistics 	<ul style="list-style-type: none"> Supply chain efficiency in retail trade (applying apps that connect accomodation and transportation) Enlarging demand for tourism 	<ul style="list-style-type: none"> More than 4.659 merchant, majority are SME. Has launched city based portal form SME. Supply chain efficiency Logistics 	<ul style="list-style-type: none"> The startup supports local SME Supply chain efficiency Logistics
POLICY CHALLENGES	<ul style="list-style-type: none"> Level of playing field Fragmented payment platform Lack of interoperable payment Offshore funding 	<ul style="list-style-type: none"> Level of playing field Fragmented payment platform Lack of interoperable payment Offshore funding 	<ul style="list-style-type: none"> Level of playing field Fragmented payment platform Lack of interoperable payment Offshore funding 	<ul style="list-style-type: none"> Level of playing field Fragmented payment platform Lack of interoperable payment Offshore funding

^{*)} As of 2017
1 USD = Rp 13.655

Payment System Development for Digital Economy and Finance

Objective

Developing payment system for digital economy and finance to support financial inclusion and national economy, particularly SMEs and people's economy

1

Developing National Payment Gateway

- Objective: to integrate payment instruments, delivery channels, and transactions through interconnection and interoperability of domestic transaction to be more efficient and faster using any instrument in any financial institution.

2

Accelerating Electronification in the Economy

- Electronification for social transfer, government operation, mode of transportation, remittance, billing payment, and invoice.

3

Developing Fintech in the area of Payment System

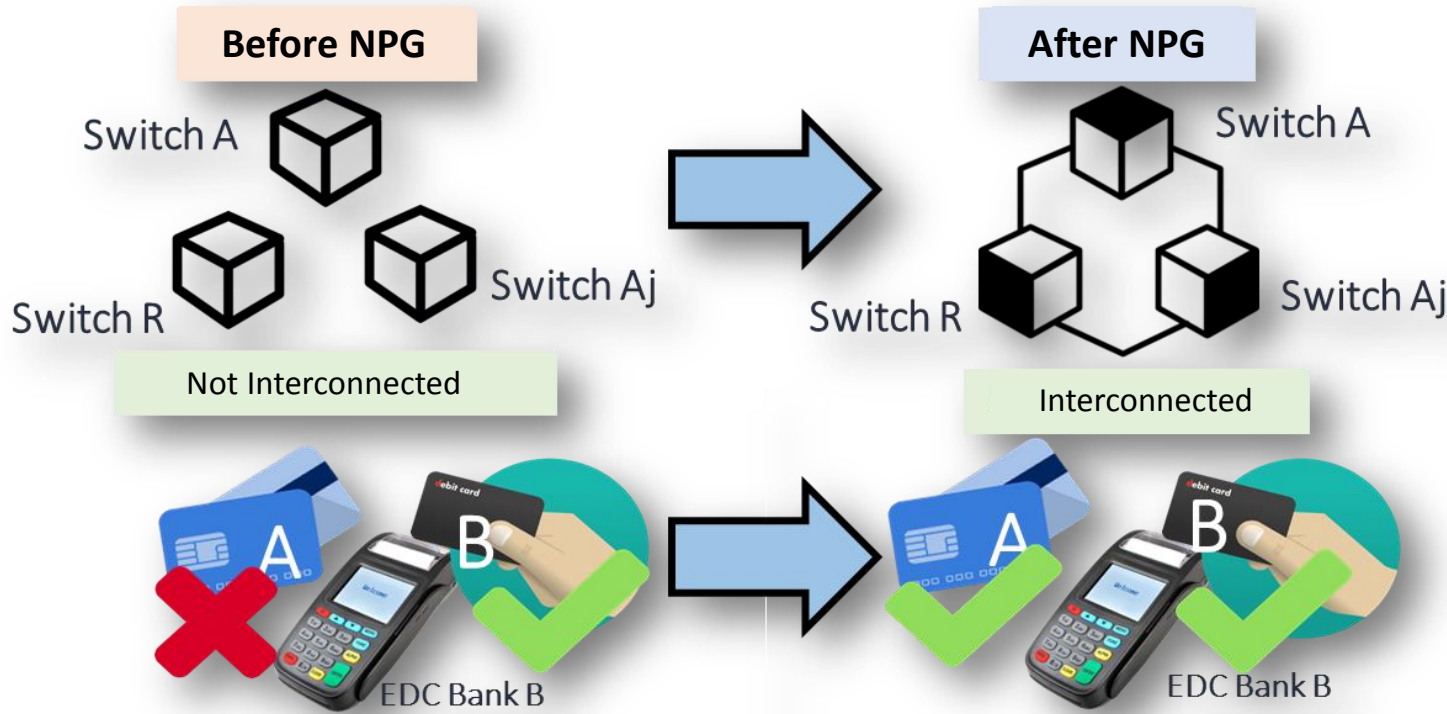
- Promoting Fintech innovation while at the same time taking into account consumer protection and prudential principles: Regulatory Sandbox.
- Coordination with government and OJK to develop e-commerce and Fintech as digital market for SMEs financing and people's economy.

National Payment Gateway



- ❑ Launching - 4 December 2017
- ❑ National Branding for domestic card & transactions

Develop interconnectedness, interoperability and domestic transaction processing capability to serve national payment



NPG Arrangement

Domestic transactions are required to be **processed/routing in domestic**

NPG operators consist of **Standard, Switching, Services**

Interconnectedness among switches and requirement to **connect to minimum 2 NPG Switching** to create **interoperability of payment instrument and delivery channel**

Fair and efficient **pricing policy**

Domestic branding for national identity

Electronification

Strengthen the electronification that synergizes with various government programs and continues to support government efforts to improve efficiency and governance of financial transactions

Policy

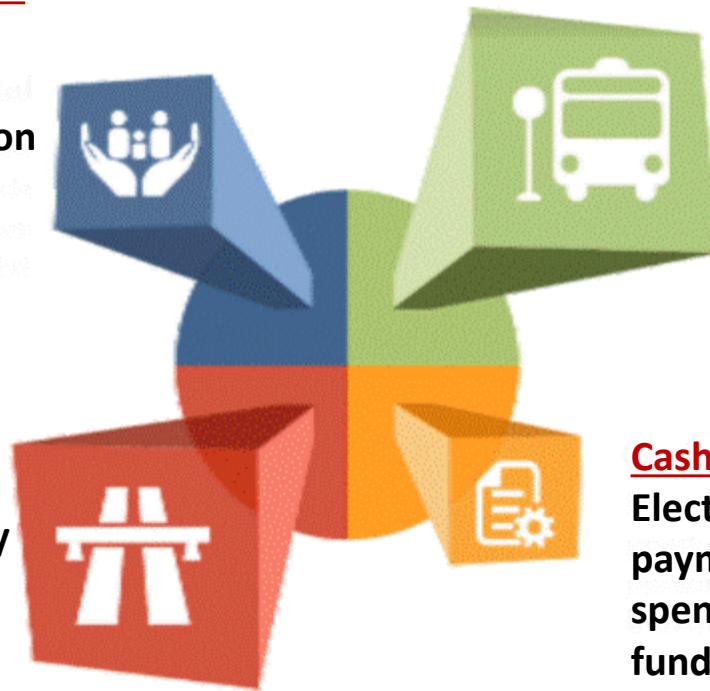


Social Assistance Program

Expansion of social assistance program electronically to 10 million beneficiaries of poor families and 3,9 million beneficiaries of food aid fund.

Toll Road

Supports the expansion of toll road interconnection by implementation of Electronic Toll Collection (ETC) and Multi Lane Free Flow (MLFF) implementation



Transportation

Interoperability and interconnection electronic payment system among modes of transportation

Cash Management System

Electronification of all payment and government spending (i.e. Village fund, School fund)

Realization (Feb 18)

Social Funds for Poor Family

Nominal	Rp 2362.9 billion
---------	-------------------

Nominal	Rp 240.2 billion
---------	------------------

Toll Road

Implementation of electronification in toll road has achieved 98% of total national toll road.

The Role of Bank Indonesia in Fintech



Nurture Digital Innovation

- Create space and facilitate innovation
- Electronification and Financial Inclusion
- Provide a conducive ecosystem (interoperability, interconnectedness and sharing infrastructure)
- Research Frontier (CBDC, DLT, Blockchain)

Preserving stability & integrity

- Standardization to reduce fragmentation
- Consumer protection issues
- Reduce and control disruption (Collaborative Environment)
- Regulate and educate Virtual currency
- Prevent Cyber Risks
- Building Infrastructure

Striking the right balance: policies to nurture the digital innovation while preserving stability and integrity

The complex block contains five icons: a globe, a classical building with columns, a document with a pen, a dollar sign inside a circle, and two stacks of coins.

General Principle
Consumer protection, risk management, and prudence

Scope
Registration, Regulatory Sandbox, Permits & approvals, monitoring & supervision.

Registration Obligation

- Financial Technology Provider on payment system must register with Bank Indonesia
- Registered Financial Technology Provider remains obliged to submit information to Bank Indonesia on transaction data and other information.

AML CFT
Must comply with AML CFT.

Virtual Currency
VC is not a legal tender in Indonesia. Financial Technology Provider is prohibited to conduct payment system activities by using VC.

Fintech Initiatives

Registration

- ❑ **FinTechs in Payment** are required to register to the central bank.
- ❑ **Other types of FinTech** will be registered by related authority
- ❑ Registration started on **January 2018**
- ❑ End of Feb 2018:
 - **90 Fintechs have discussed** with BI for registration process
 - **15 Fintechs** is being registered (on going process)



Regulatory Sandbox

- ❑ A 'safe space' where businesses can **test innovative products, services, technology, and business models with some limitation** (number of user, transaction value, area of services, etc).
- ❑ The duration of BI Regulatory Sandbox is **6 (six) months**
- ❑ Will be kicked off on **March 2018**



FintechVil

- ❑ FintechVil **facilitate and educate SME** to sell their product on the e-commerce website (also receive payment electronically)
- ❑ In 2017, BI started **FintechVil Pilot Project in several cities** in DKI Jakarta, West Java (Bandung, Tasikmalaya, Cirebon), and Banten, in collaboration with e-commerce player
- ❑ In 2018, BI will **expand the FintechVil initiatives to 7 cities*** in Indonesia



Cyber Security: Policy Measures

As a regulator, Bank Indonesia continually pursues improvement on security aspect in the industry through framework of cyber resilience.

FSB Stocktake of Publicly Released Cybersecurity Regulations, Guidance and Supervisory Practices recommend the importance of establishment of Regulations and Guidance targeted to CyberSecurity and/or IT Risk.

Indonesia is required to establish National Strategy and Future Plans on Cybersecurity Regulations, Guidance and Supervisory Practices.

All of Supervisory and Regulatory Agency in Indonesia should develop the cybersecurity guideline.

Cyber Resilience Framework – BI as Regulator

Regulatory Approach

- ✓ Entry policy; Risk management
- ✓ IT Audit; AML CFT
- ✓ Liability to use chip and 6 Digit Online PIN, 2 factor authentication
- ✓ Operator certification
- ✓ Hardware specification

Developing Guidelines

Fraud Detection System

Supervisory Approach

- ✓ Enhancing oversight system through data and reporting integration
- ✓ Hybrid framework
- ✓ The closure of illegal activities

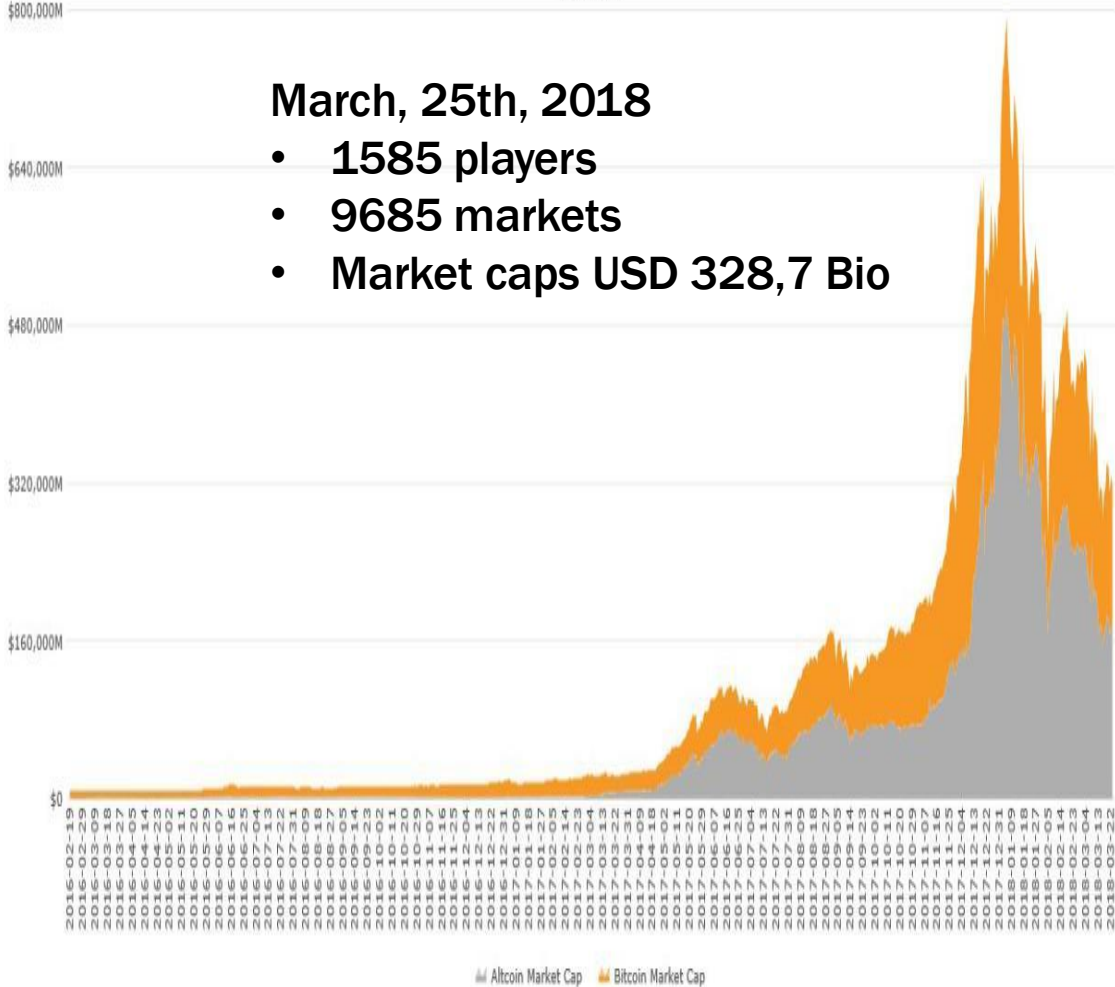
III. Virtual Currency and effectiveness of Monetary Policy

Characteristics of Currencies: A Comparison Virtual Currency & Beyond

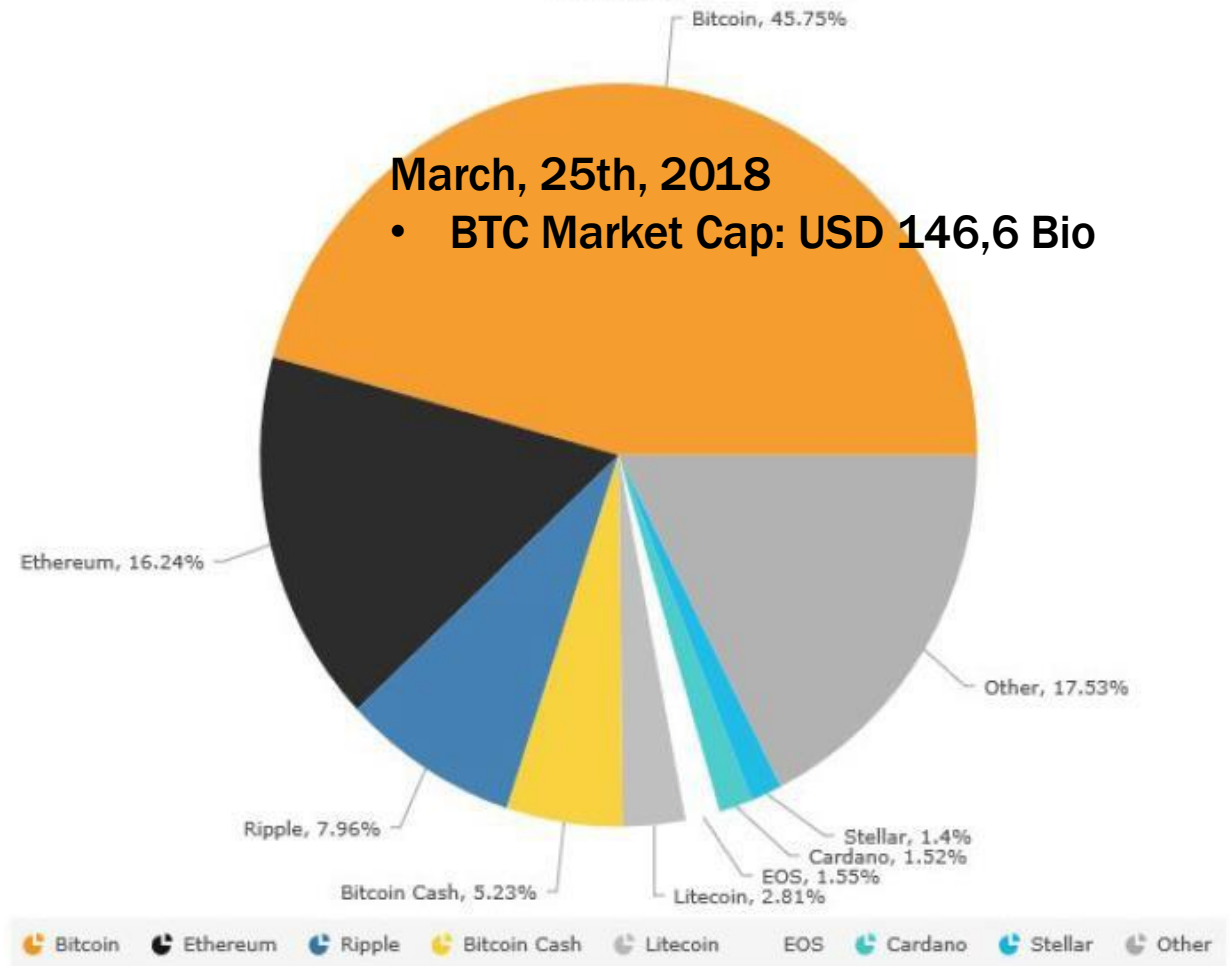
Feature	Bitcoin	USD (home currency)	Euro (foreign currency)	Commodity (bullion)	Commodity currency (coin)	Gold standard
Intrinsic value	None	None	None	Yes	Yes	None
Claim to issuers?	No	Yes	Yes	No	No	Yes
Legal tender	No	Yes	No (in the U.S.)	na	na	Mixed
Used as a medium of exchange	Small, but rising especially in online Retail	Yes	Limited (in the U.S.) possibly more for cross-border trade	Yes	Yes	Yes
Used as unit of account	No	Yes	No (in the U.S.)	Yes	Yes	Yes
Used as store of value	Yes, subject to very high exchange rate risk and sudden confidence shock	Yes, subject to inflation risk	Yes, subject to foreign exchange risk	Yes, subject to commodity price risk /cycle.	Yes, subject to dilution of quality (inflation/devaluation)	Yes, subject to devaluation risk
Monopoly/decentralized	Decentralized	Monopoly	Monopoly	Decentralized	Mixed	Mixed
Supply source	Private	Public	Foreign public	Private/public mining	Mixed	Mixed
Supply quantity	Inflexible	Flexible	Flexible	Inflexible	Inflexible	Inflexible
Supply rule	Computer program	Rule-based (inflation target)	Rule-based (inflation target)	Opportunity cost for mining	Tied to commodity in bullion	Tied to commodity by reserve ratio
Supply rule change (by issuers) possible?	Yes with agreement of majority miners	Yes	Yes	No	Quality of minted coins can be diluted.	Reserve ratio can be changed and economized
Cost of production	High electricity consumption for computation	Low	Low	Very high (mining)	Medium	Low

Market Cap – Virtual Currency

Cryptocurrency Market Caps (historical)
coin.dance

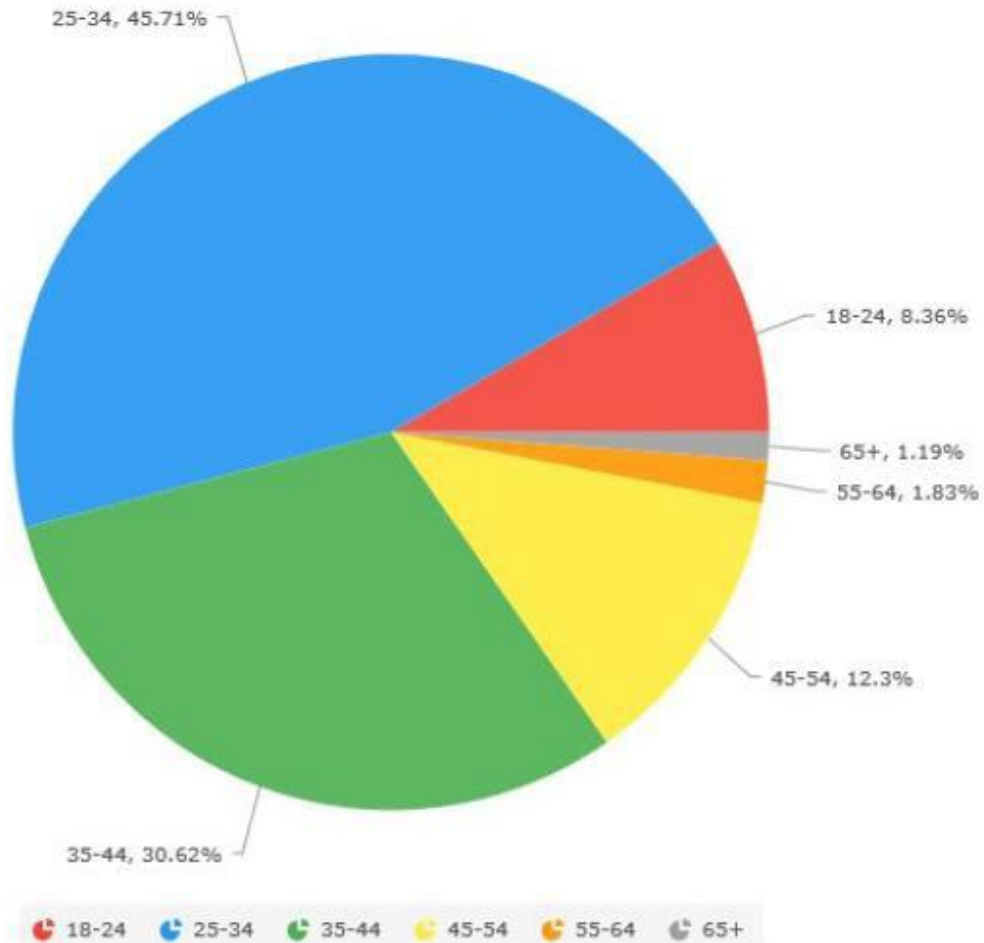


Cryptocurrencies by Market Cap
coin.dance

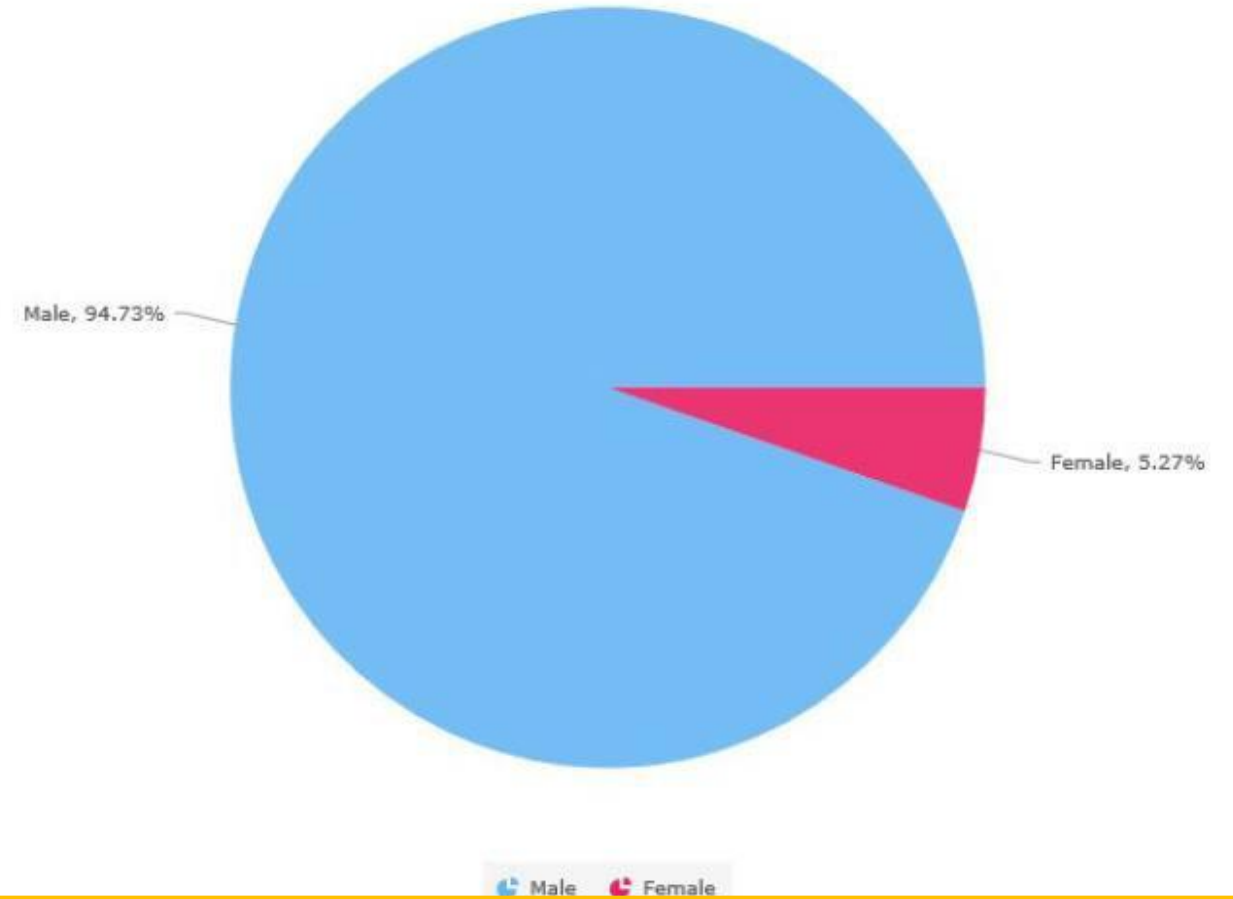


Demography of the most popular VC – Bitcoin

Bitcoin Community Engagement by Age (Google Analytics | 18+ only)
coin.dance



Bitcoin Community Engagement by Gender (Google Analytics)
coin.dance



Virtual currency...

01

No Regulator

- No regulation for the agent, as well the algorithm of virtual currency
- Not a legal tender
- No legal certainty in case of losses

02

Peer-to-peer

- Transaction without formal *intermediary*
- No Settlement finality
- Questionable Legal status of ownership of *digital currency*
- Inexistence of center fro customer complaints

03

Pseudonymity

- Unclear identity, prone for illegal activity

04

No Central Authority

- No regulatiory body
- supply – demand
- And no consumer protection

Virtual currency as money ???...

Not sufficient to fulfill the function of money:

• Volatility limit the store of value function

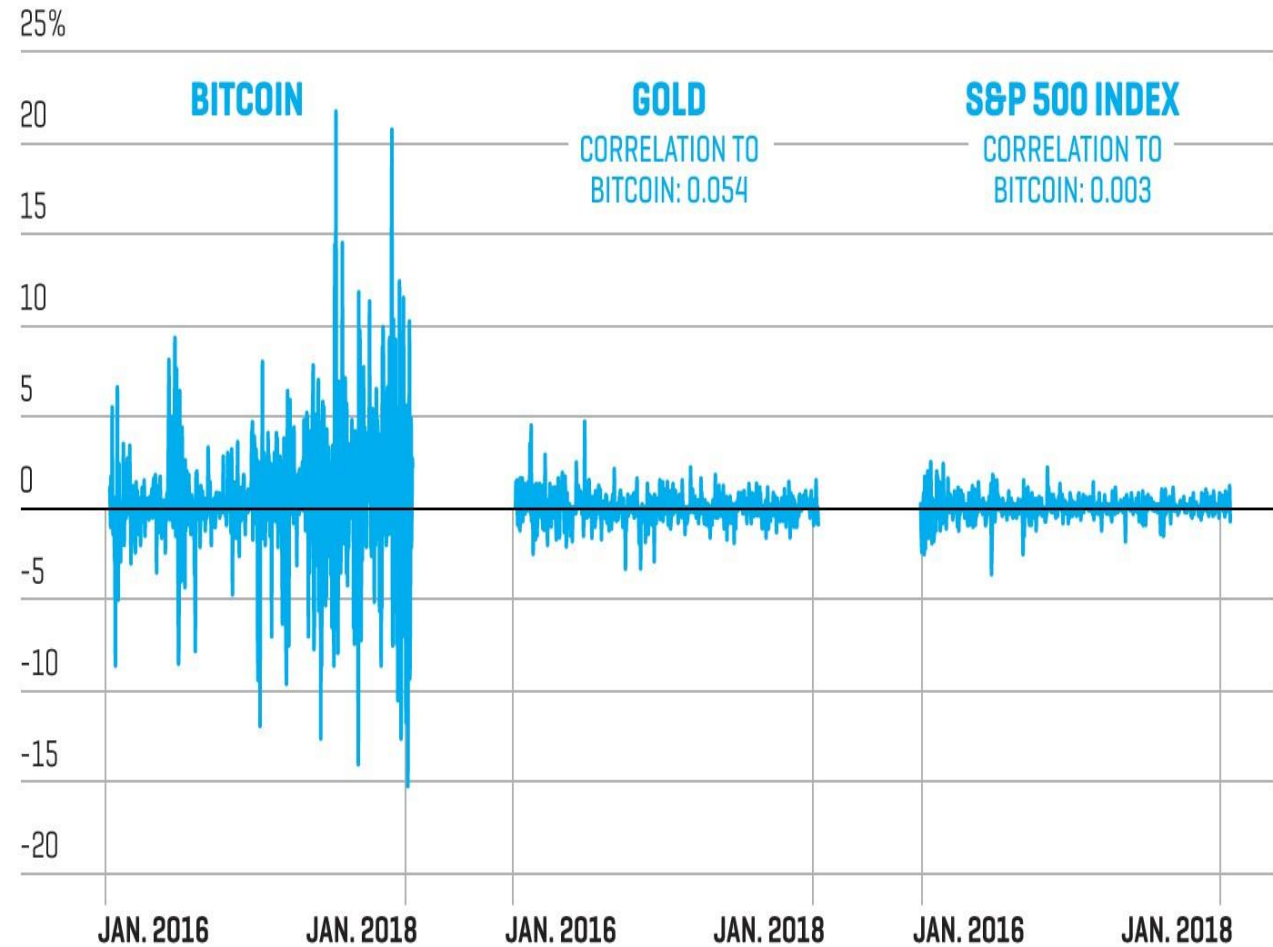
- Instable price and volatility unrelated to economic and financial factors. Hence, difficult to hedge or forecast (Yermack, 2013).¹⁴

• Limited Acceptance of VC as Medium of Exchange

- Not a legal tender
- Growing fast, but relatively low market capitalization of VC
 - Jan 2016, US\$7 billion, compare to USD in circulation US\$1.4 trillion,
 - And U.S. money supply (M2) US\$12 trillion.

• Minimum use as unit of account.

DAILY PERCENT CHANGE IN PRICE OF BITCOIN, GOLD AND S&P 500



SOURCES: S&P GLOBAL; CITI PRIVATE BANK; BITCOINCHARTS

Implied Risk of Virtual currency (1) ...

Virtual currency impose risks to the payment system, financial stability, illegal activity and consumer protection

1. Payment System



- Convertability risk : no guarantee of exchange to *fiat money*,
- Consumer protection risk :
- Investor risk
- Operation risk : Hacking, Cyber threat, irreversible transaction, can not be corrected

2. Financial



- Destabilise the Financial System if grows too fast and the *bubble burst*
- High price volatility based on supply and demand expectation (spekulative)
- Regulatory arbitrage as transaction can be executed from other countries with more accomodative rules

Implied Risk of Virtual currency (2)...

3. Illegal Activity



▪ Money Laundering risks :

- Weak KYC is prone to illegal transactions, money laundering, prohibited trade, tax avoidance , terrorism funding
- *pseudonymity in transaction mechanism* , difficult to identify
- Difficult to freeze in case of criminal related transaction

4. Customer Protection



- Lack of regulation of *virtual currency*
- *Disguised operator*

Potential risks of privately issued digital currencies to Monetary Policy (1)

1. Low risks if private DC only serve as a medium of exchange

As long as private digital currencies are merely used as a medium of exchange and are not considered as a unit of account or as a store of value, they should not pose significant threats to monetary policy.

1. In principle, it works in a similar fashion to prepaid types of e-money instruments (e.g. electronic wallets such as **Apple Pay** and **PayPal**).
2. The net effect on the amount of money used for transactions should be limited, implying that the central bank maintains its ability to influence the money supply, short-term interest rates, and, hence, aggregate demand.
3. when only used as a medium of exchange, in theory, it is not be prone to too much volatility – as its circulation depends on demand for it, and not on any speculation about its future price

Potential risks of privately issued digital currencies to Monetary Policy (2)

2. Financial stability risks if private DC also serve as a store of value

1. it has no intrinsic value: intrinsically, they are nothing more than lines of computer code.
2. Not Carry any legal value, not backed by a sovereign entity
3. They are not legal tender –for instance, not accepted to discharge tax obligations.
4. Depends entirely on an expectation of others' willingness to accept it later at a sufficiently greater value (Lo and Wang, 2014).

This characteristic renders private digital currencies conducive to speculation and, hence, subject to bubbles.

- **the price of digital currencies can be very volatile**

However, So far, the total value of all digital currencies seem to be too small to pose a systemic threat to financial stability and monetary policy

Potential risks of privately issued digital currencies to Monetary Policy (3)

3. Monetary and financial stability risks if private DC also serve as a unit of account (bitcoinised)

The greatest hypothetical risk to monetary policy that might be posed by private digital currencies would be if they grew to a point where they were generally accepted and used as units of account.

In this case, private digital currencies would substitute for the bulk of sovereign currency-denominated regular money, including central bank money.

MONETARY POLICY IMPLICATIONS (1)

A widespread substitution would have a number of monetary policy implications.....

- a. Monetary Policy might **become less effective in managing aggregate demand**
- b. If sovereign money no longer served as the base money in the economy, **the central bank would essentially lose control over monetary conditions**
- c. **Monetary policy lose any discretion to be part of a stabilisation policy**, such as ineffectiveness in responding to any structural change in labor markets.

MONETARY POLICY IMPLICATIONS (2)

A widespread substitution would have a number of monetary policy implications.....

- d. a drain on regular money could also erode a central bank's capacity to act as lender of last resort in the event of bank liquidity shortfalls.
- e. nor would it offer the protection of a deposit insurance scheme in the event of a bank failure.
- f. A large-scale adoption of Digital Currency might contribute to deflation in prices of goods and services

Opportunities of digital currencies for monetary policy (1)

1. According to some observers, DLT has the potential to **improve the efficiency and security of existing payment systems.**

The efficiency argument relates to the direct settlement mechanism embedded in distributed ledgers: this has the potential to not only raise the speed of settlement but also to lower settlement costs compared with traditional payment systems.

Opportunities of digital currencies for monetary policy (2)

2. Central banks' interest in the distributed ledger technology, however, is not limited to investigating potential interbank applications. In fact, they are increasingly pondering the potential of this new technology to serve as a platform for the issuance of a digital form of banknotes – a so-called “**central bank digital currency**” (CBDC).

Hence, from a broader economic perspective, the DLT offers a potential efficiency gain for central banks to expand their role by widening electronic access to their balance sheets – that is, beyond commercial banks

Opportunities of digital currencies for monetary policy (3 a)

IMF report May 2018

The latest annual report of the International Monetary Fund has concluded that cryptocurrency does not pose a threat to global economic stability. Or at least not yet.

Every year the IMF published a report detailing the economic state of the world. This year's report is entitled "A Bumpy Ride Ahead" and features a chapter on cryptocurrency

The report explains that despite the "spectacular appreciation" of crypto-assets over 2017/18, their total market value is less than three percent of the combined value of the balance sheets of the four biggest banks in the world. Even at the peak of their popularity, they barely hit six percent.

Opportunities of digital currencies for monetary policy (3 b)

IMF report May 2018

The report notes that the industry is still very concentrated; Bitcoin, Ethereum, and Ripple account for 80 percent of all cryptocurrency market capitalisation – Bitcoin alone makes up 47 percent.

Although there are more than 180 active cryptocurrency exchanges throughout the world, more than 80 percent of trading is conducted at the top 14.

Surprisingly, the IMF calculated that an investor would have made more money from FANG stocks (Facebook, Amazon, Netflix, Google) than crypto-assets over the last three years.

Opportunities of digital currencies for monetary policy (3 c)

IMF report May 2018

Moreover, the groundbreaking release of Bitcoin futures by the Chicago Mercantile Exchange and Chicago Board Options Exchange in December 2017 has not had as big an effect on the world as was expected by some: “...futures volumes represent a small fraction of overall trading activity on the CME and CBOE and only 2.3 percent of reported trading in the Bitcoin cash market on [cryptocurrency exchanges]...”

Central Bank Digital Currency????

Is a desirable outcome??

- On the one hand, by (partially) substituting for cash, a CBDC could relax the so called “effective lower bound” constraint on nominal interest rates, which could promote macroeconomic stability.
- On the other hand, by providing competition for bank deposits, a CBDC could have profound implications, either positive or negative, for the banking sector.

Some – still fairly speculative issues

- Could a CBDC solve the problem of the effective lower bound on interest rates?
- How would a CBDC affect the banking sector, financial stability and economic activity

IV. Indonesian Policy Responses

BANK INDONESIA on Virtual Currency

For the time being before further studies



Forbid:

- **all payment system operator** (principal, switching operator, clearing operator, final settlement operator, issuer, acquirer, payment gateway operator, electronic wallet operator, money transfer operator) and
 - **financial technology operators** in Indonesia, both bank and nonbank institution
- to process transactions using virtual currency**



Warn:

- all parties not to sell, buy, or trade virtual currency

Ownership of virtual currency is **highly risky and loaded with speculations**, considering there is **no authority responsible, no official administrator, no underlying assets** to base the virtual currency price, and that the trade value is highly volatile.

Virtual currencies are vulnerable to **bubble risks**, and susceptible to be used for **money laundering and terrorism financing**, therefore can potentially impact **financial system stability** and cause **financial harm to society**

V. CONCLUSION

CONCLUSION

1. ***A balanced policy to promote digital innovation while keeping the financial stability and economic integration in check***
 - a. Further studies on regulating Virtual Currency
 - b. Further studies on issues of a so-called Central Bank Digital Currency (CBDC) is needed.
 - i. Could CBDC help relax the effective lower bound constraint on nominal interest rates, which could promote macroeconomic stability?
 - ii. How about the impact to the banking sector and financial stability?
 - iii. By providing competition for bank deposits, could the adoption of a CBDC limit the practice of fractional reserve banking, thereby strengthening financial stability?

CONCLUSION

2. Too widespread a substitution of bank deposits by CBDC could lead to a significant de-funding of the banking sector, with negative spillover effects on credit creation and economic activity.
3. As an additional and very easily accessible safe asset, a CBDC might act as a vehicle for digital bank runs, undermining – rather than promoting – financial stability and the effectiveness of monetary policy.

THANK YOU