Electronic Money and Virtual Bank

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Middle income trap

World Bank (Indermit & Kharas, 2007)

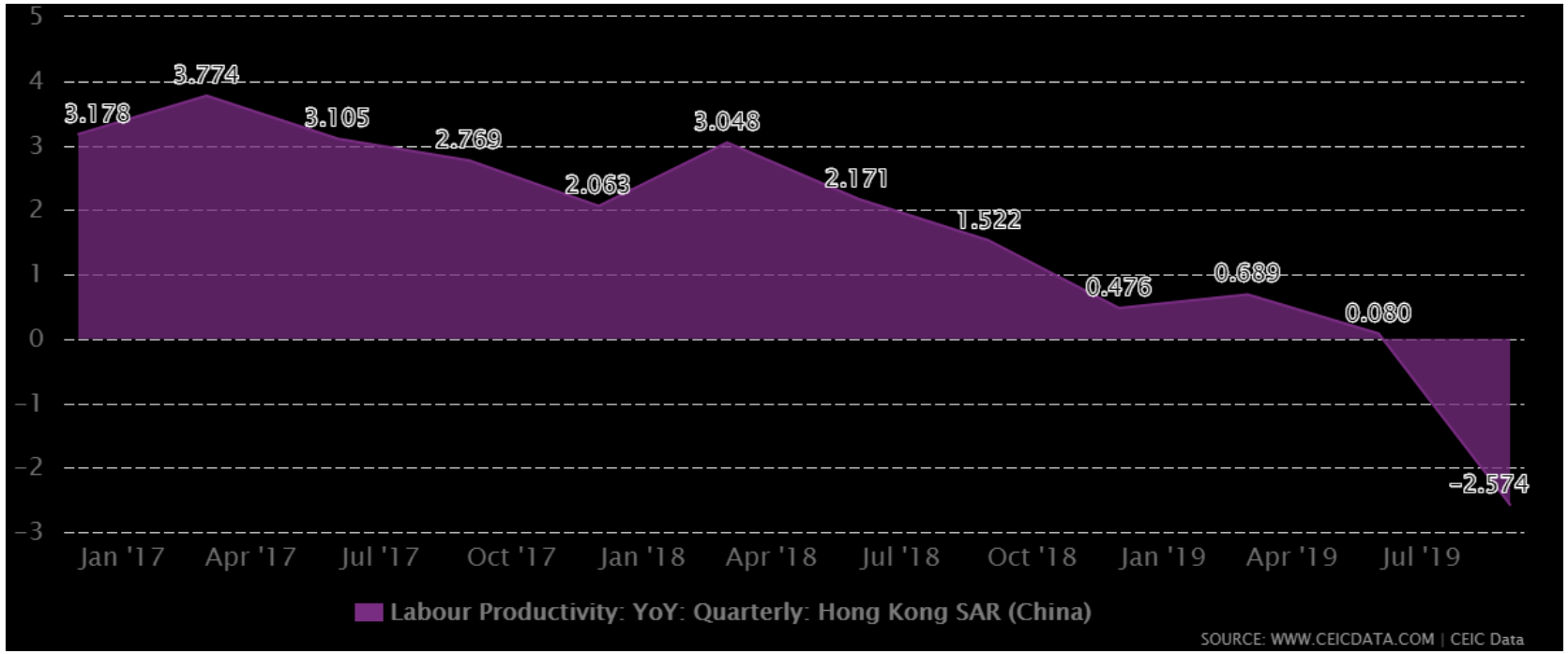
The middle income trap is a situation in which a country that attains a certain **per-capita income** gets stuck at that level.
- facing competitive disadvantage in the export of manufacturing goods as a result of rising wages

$$\text{Productivity} = \frac{\text{Units of output}}{\text{Units of input}}$$

Middle income trap➔ Growth
➔Research and development
➔ **Market**
- Belt and Road Initiative
- GBA

Item	1953 Q2 To 1973 Q4	1973 Q4 To 1995 Q2	1995 Q2 To 2007 Q3	2007 Q3 To 2015 Q3	Projected 2015 Q3 To 2026 Q4
Increase in real GDP	3.6	2.8	3.2	1.2	2.4
Increase in quantity of labor	1.1	1.3	0.5	0.1	0.3
Increase in labor productivity	**2.5**	**1.5**	**2.7**	**1.1**	**2.1**

Source: Derived from *Economic Report of the President, 2016*, p. 113

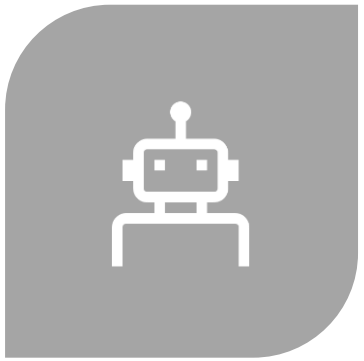


Indermit, G & Kharas, H (2007), *An East Asian renaissance: Ideas for economic growth*, World Bank, Washington DC.

CULTURE VS TECHNOLOGY

KNOWLEDGE VS THEORY

(E.G. VACCINE)



CONTROL OF KNOWLEDGE AND TECHNOLOGY

Electronic Money

Electronic money 電子貨幣

Electronic money (Digital Currency, digital money, electronic currency or cyber cash).

Physical currency, like banknote and minted coin, is **tangible** and transaction is possible only by their holders who have their **physical ownership**.

Electronic money doesn't have a physical form. It is **intangible,** a digital store of a medium of exchange on a computerized device (with or without bank accounts). It can only be owned and transacted in by **using computers, mobile phones or electronic wallets** connected to the Internet or the designated networks.

e.g., **Octopus card** in Hong Kong, **cryptocurrency(**加密貨幣)/ **bitcoin (**比特幣)

https://tipalti.com/electronic-money-emoney-explained/
https://www.investopedia.com/terms/d/digital-currency.asp

Bitcoin 比特幣

- Bitcoin is the **first** established **cryptocurrency (**加密貨幣) in the world.
- It was born out of the **2008 global financial crisis** when global central banks began to **massively print money** (quantitative easing) ➔**Loss of confidence** in central authority and **national fiat money** (no intrinsic value)
- Invented by an **unknown person or group of people** using the name Satoshi Nakamoto (中本聰), bitcoin is **designed to allow online peer-to-peer payments without** a trusted central authority such as a **central bank** or a trusted administrator or the need for an intermediary financial institution (**no need octopus card platform**) ➔ an **alternative** to **national fiat money**

- Digital currency (n.d.). In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Digitalcurrency
- Guide: What is Bitcoin and how does Bitcoin work? – CBBC Newsround (2018, October 31) Retrieved from https://www.bbc.co.uk/newsround/25622442
- Investor and Financial Education Council (n.d.) ICO, Bitcoin and other "cryptocurrencies". Retrieved from 錢家有道 https://www.ifec.org.hk/web/en/financial-products/fintech/ico-bitcoin/ico-bitcoin-cryptocurrencies.page

No intrinsic value / not a legal tender -Why trust bitcoin?

- It offers three core values: **Decentralization, Open Source, and Peer-to-Peer networking.**
- Backed by mathematics and cryptography(密碼學), bitcoin uses **peer-to-peer** technology to operate with **no central authority** or banks;
- Managing transactions and the issuing of Bitcoins is **carried out collectively by the network**.
- Bitcoin is **open-source**; its design is **public, nobody owns or controls Bitcoin** and everyone can take part.
- **Scarcity**: limited at **21 million** bitcoins **(enough?)** and its supply cannot be changed.
- **Worldwide** payments: people can exchange with someone anywhere in the world without restrictions or borders – like an online version of “cash” ➔ Global
- **Low processing fees**

- https://www.bitcoin.com/get-started/faq/
- - Bitcoin Project (n.d.) Some things you need to know https://bitcoin.org/en/you-need-to-know
- - Bitcoin Project (n.d.) Bitcoin – Open Source P2P Money https://bitcoin.org/en

Bitcoin and Blockchain

- Bitcoin's design **prevents** **the Double Spending Problem** with a technology called "**Blockchain (區塊鏈)**", using cryptographic techniques (密碼技術).
- The **double spending problem** is a **potential flaw** in a cryptocurrency or other digital cash scheme whereby the **same single digital token** can be **spent more than once**.
- The use of **blockchain** helps **verify and record the transactions** of bitcoins.
  - ✓Every transaction is **recorded** in a **shared public ledger**.
  - ✓New transactions **are** grouped into blocks, verified by other users in the network, and added to the blockchain.
  - ✓It is **very difficult to change a record** once it is added to the blockchain.

- Chohan U. W. (2017). *The Double-Spending Problem and Cryptocurrencies*
- Investor and Financial Education Council (n.d.) Basic concept – Blockchain. Retrieved from https://www.ifec.org.hk/web/en/financial-products/fintech/ico-bitcoin/basic-concept-blockchain.page
- Zhang, R, Xue, R, and Liu, L. (2019) Security and Privacy on Blockchain. *ACM Computing Surveys. 52*(3), Article 51

Bitcoin Mining

- **Bitcoins are created** by a **process** called "**mining**" to reward bitcoin miners for spending computing power to **process transactions and secure the network**.
- This process is **decentralized** - anybody can become a bitcoin **miner** by running software with specialized hardware to **help process bitcoin transactions** for everybody, and **no individual has control** over the network.
- The machines are made to work out incredibly difficult sums.
- Occasionally these machines are **rewarded** with some amount of bitcoin for the owner to keep.
- The sums are becoming increasingly difficult in order to slow down the creation of bitcoin.

What "backs" the money supply?

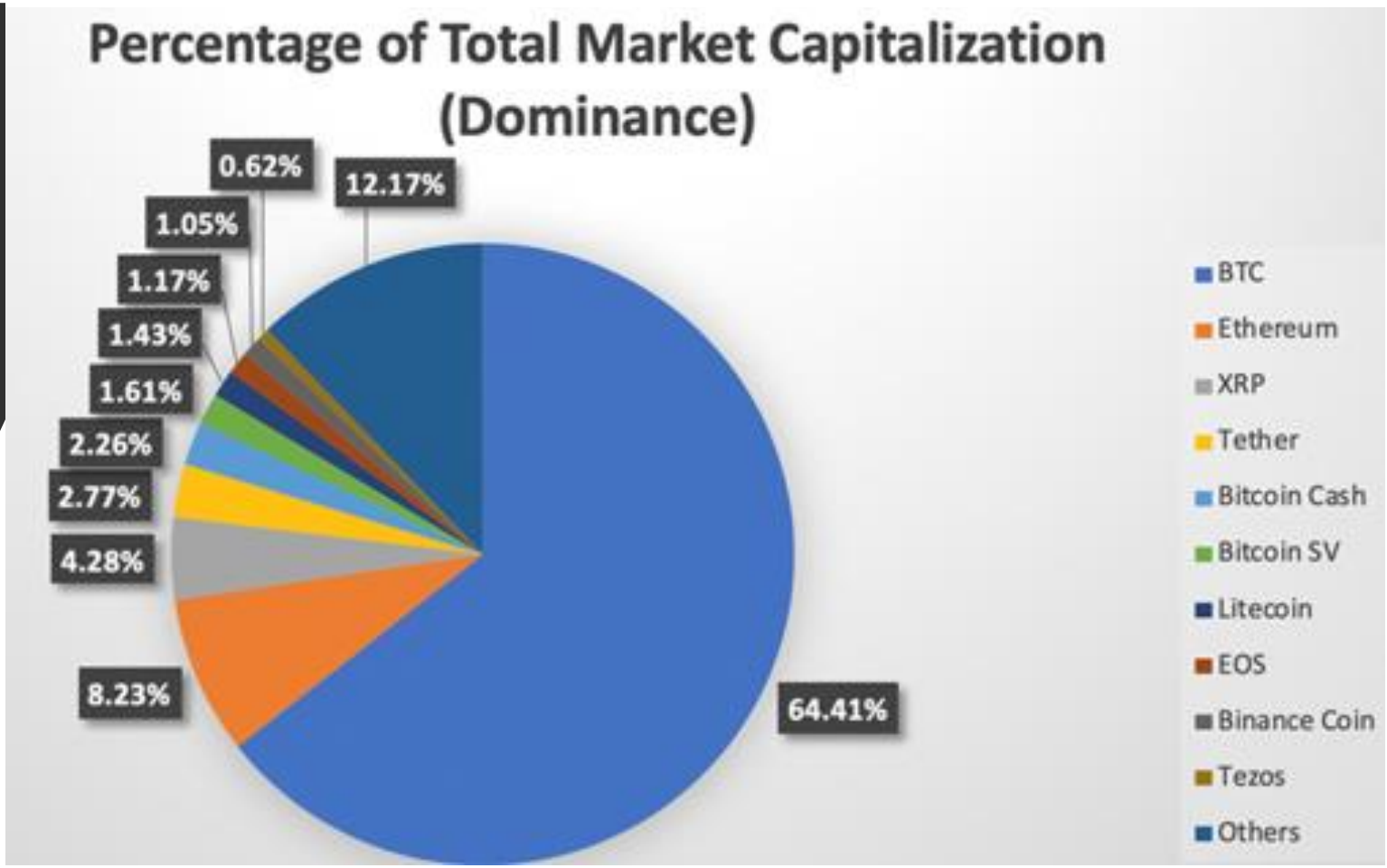
- Money is **debt**; **paper money** is a **debt** of Central Banks and **checkable deposits** are **liabilities** of banks

- Bitcoin Project (n.d.) *Frequently Asked Questions* https://bitcoin.org/en/faq

- Guide: What is Bitcoin and how does Bitcoin work? – CBBC Newsround (2018, October 31) Retrieved from https://www.bbc.co.uk/newsround/25622442

The Status of Bitcoin

- Bitcoin is the leader in cryptocurrencies.
- Bitcoin's total market capitalization (the total dollar market value) is more than USD 200 billion
- It shares around 64% of the total market capitalization of all cryptocurrencies.
- The total number of bitcoin transactions processed has exceeded 500 million
- As of 31 March 2020, there are more **than 5000 cryptocurrencies** in the world.



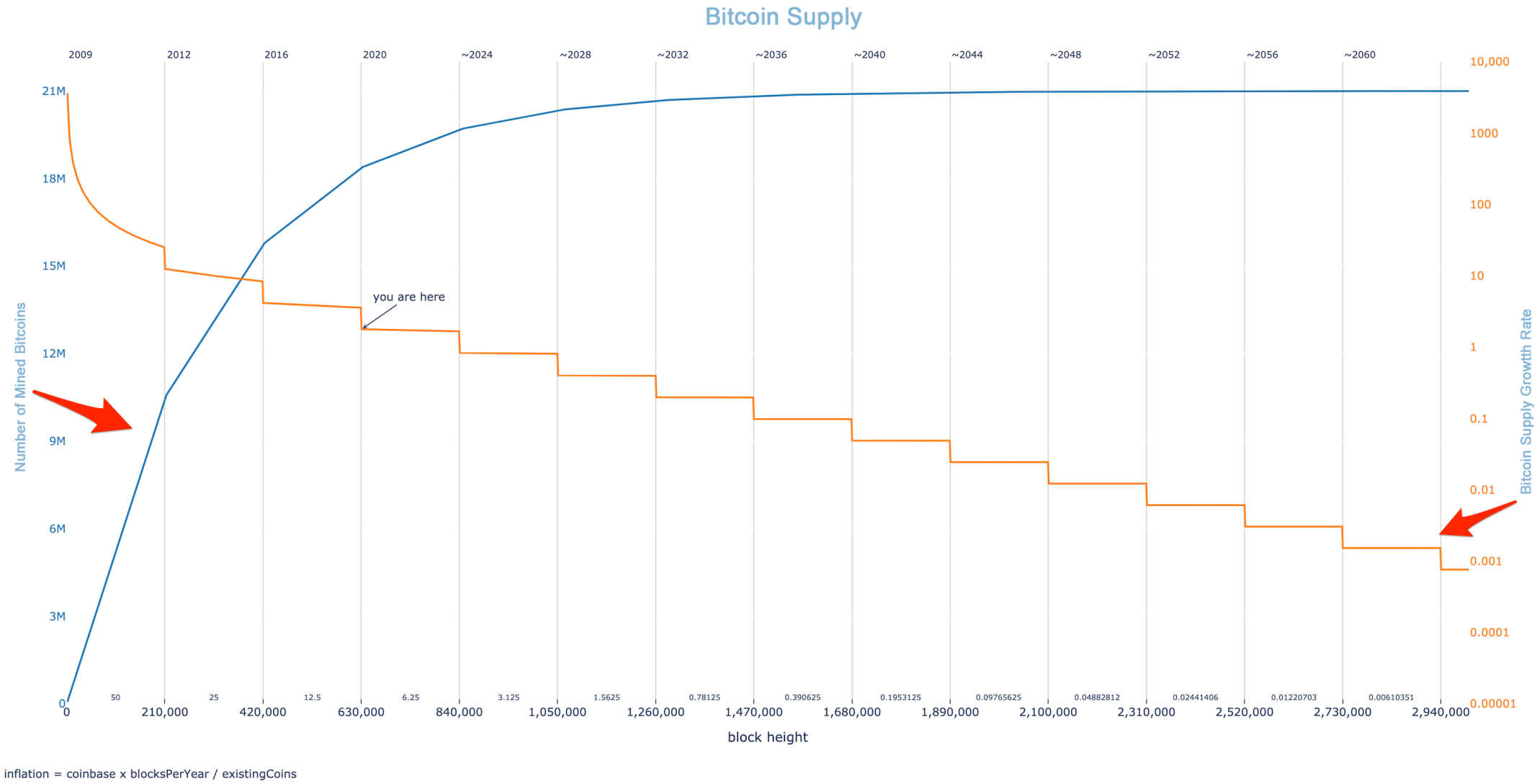
Percentage of Total Market Capitalization of Cryptocurrencies as of 30 March 2020 (Source: CoinMarketCap)

Supply of Bitcoin

- **Supply of bitcoin is predetermined** and thus **removes** the need for a trusted party to actively manage the supply and its value.
- The growth rate of bitcoin is **programmed to decrease geometrically**, with a **50%** reduction in reward for approximately **every four years** until the bitcoin issuance halts completely when a fixed hard limit of **21 million bitcoins** have been created.
- On the other hand, **the money supply M1** of the United States Dollar **grows stably – showing no sign of slowing down**.

Supply of Bitcoin

The number of mined bitcoin is **growing at a predetermined decreasing rate, until 21 million bitcoins have been created.**



Bitcoin Supply and Monetary Inflation (Source: Bashco)

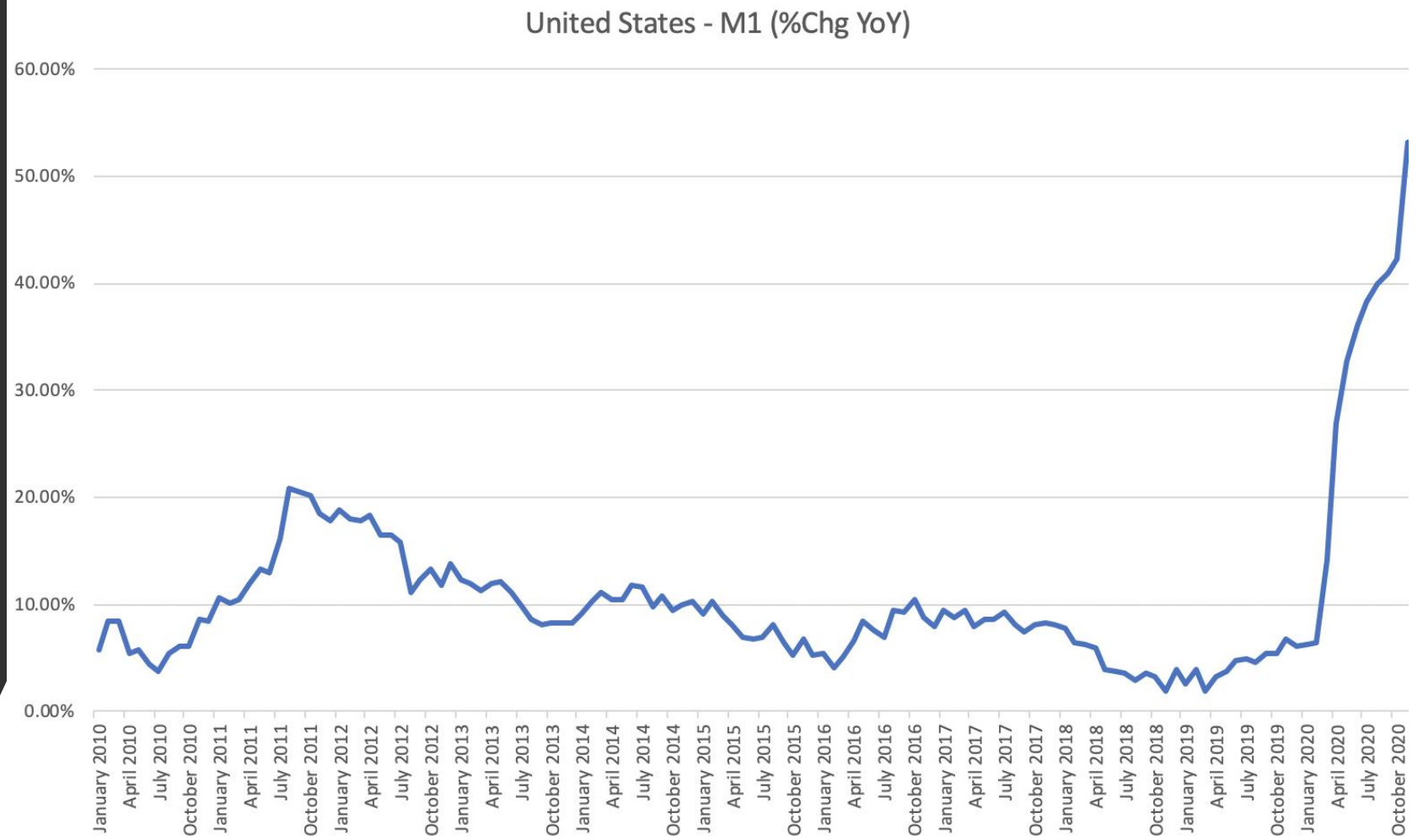
Money Supply Growth – **US Dollar**

- Compared to bitcoin, the money supply of real-world currencies, such as USD, grows steadily, without signs of slowing down. Recently, the recent growth of the money stock further accelerated due to the Fed's response to the coronavirus pandemic.

United States – Money Supply M1 2019 Jan to 2020 Nov (Source: Federal Reserve Bank of St. Louis)
Reference: https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm

Money Supply **Growth** Rate – US Dollar

- Compared to the supply of bitcoin, the **growth rate** of **USD** is much **higher**.
- This is especially true when the economy is currently under **quantitative easing**.



United States – Money Supply M1 % Change YoY, 2010 Jan to 2020 Nov (Source: Federal Reserve)

MV = PY ➔ %ΔM + %ΔV = %ΔP + %ΔY ➔ %ΔM = %ΔY

Money supply should rise by a fixed k-percent each year. K should depend on institutional factors and be determined **independently** of policymakers.

https://www.economicshelp.org/macroeconomics/inflation/monetarist-theory-inflation/

"If you really carried out the logic concerning the quantity of money, you deprive the Federal Reserve of anything to do. Suppose the Federal Reserve said it was going to increase the quantity of money by 4 percent a year, year after year, week after week, month after month. That would be a purely mechanical project. You could program a computer to do that. [……]

I've always been in favour of abolishing the Federal Reserve and substituting a machine program that would keep the quantity of money going up at a steady rate.

-- Milton Friedman
Nobel Prize-winning Economist

Bitcoin and Economy

Is bitcoin a medium of exchange?

- **Scarcity** is an important feature of bitcoin, an important characteristic of money
- Money is any item (**or verifiable record**) that is generally accepted as payment for goods and services and repayment of debts.
- Some **stores** supporting bitcoin payment include:

- **Microsoft's Xbox store** (games)
- **Beliani**, a Europe-based international seller of (furniture and home accessories)
- **Newegg**, an American online retailer (computer hardware and consumer electronics)
- **Menufy**, food ordering & delivery services

The reality

- **Usage of bitcoin** or alternative cryptocurrencies in Hong Kong is still **very limited**.
- A study revealed that in the first four months of 2019, only 1.3% of all bitcoin transactions are made to pay for goods or services.

- Kharif, O. (2019, May 31) Bitcoin's Rally Masks Uncomfortable Fact: Almost Nobody Uses It. *Bloomberg*. Retrieved from https://www.bloomberg.com/news/articles/2019-05-31/bitcoin-s-rally-masks-uncomfortable-fact-almost-nobody-uses-it?srnd=cryptocurrencies

Issue 1

- Risk of **structural deflation** – **when used as money**, the money supply does not grow with the economy
  - MV ≡ PY ➔ M↓(or fixed), Y↑, with fixed V ➔ P ↓
  - With **a very low growth rate in M** and a **constant V**, economy growth (Y) at a rate higher than the money supply growth will inevitably result **in** a **decrease** in price level, P **(very high value of bitcoin)**
  - ➔ **Satoshi,** the **smallest** unit of bitcoin, 100,000,000 Satoshis = 1 Bitcoin.
  - An alternative to M ↑ increase?? ➔ Bitcoin value (who hold a large amount of bitcoins)
- **Unable to respond** to temporary shocks to money demand
  - Monetary policies to stabilize the economy?

- Drasch. B. J., Fridgen G. and Manner-Romberg. T. el ta. (2020) The token's secret: the two-faced financial incentive of the token economy. *Electronic Markets.* 30, pp.557–567
- Elwell, C. K., Murphy M. M. and Seitzinger M. V. (2015) Bitcoin: Questions, Answers, and Analysis of Legal Issues. *CRS Reports*
- Krugman, P. (2011, September 7). Golden Cyberfetters. *New York Times*

Issue 2

➢The **demand** for bitcoin is primarily driven by **speculation**

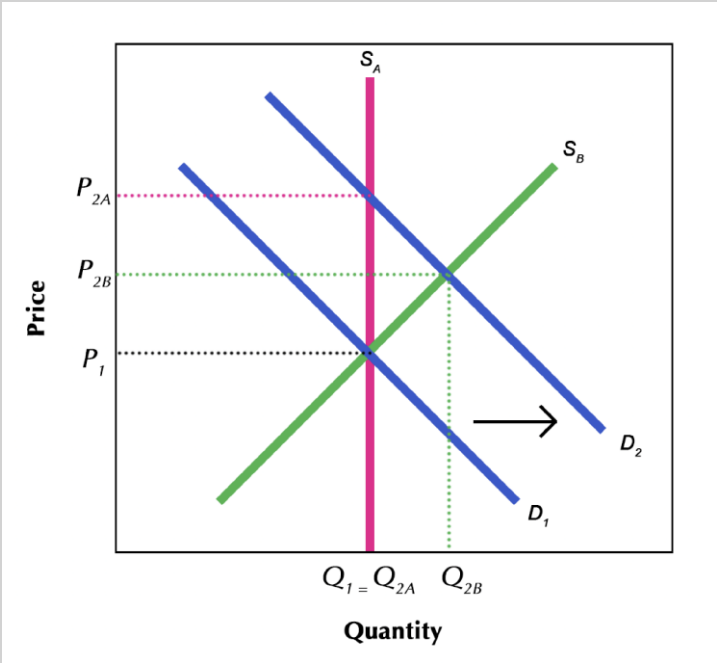
- Bitcoin is **a fiat** currency **without an intrinsic** value and hence is **based on trust** that it will be valuable and accepted as a medium of exchange in the future.
- The **demand for bitcoin** is **driven by its value in future exchange**, whereas the **demand for commodity currency is driven by both its intrinsic value and its value in future exchange**. Positive and negative news cause a **large fluctuation** in demand in bitcoin.
- **Note:**

A **commodity currency** is a currency that co-moves with the world prices of primary commodity products, due to these countries' heavy dependency on the export of certain raw materials for income e.g., Canadian dollar (oil)

- Kharif, O. (2019, May 31) Bitcoin's Rally Masks Uncomfortable Fact: Almost Nobody Uses It. *Bloomberg.* Retrieved from https://www.bloomberg.com/news/articles/2019-05-31/bitcoin-s-rally-masks-uncomfortable-fact-almost-nobody-uses-it?srnd=cryptocurrencies
- Greco T.H. (2001) Money: Understanding and Creating Alternatives to Legal Tender. White River Junction, Vermont: Chelsea Green Publishing.
- Ciaian P., Rajcaniova M. and Kancs D (2015) The economics of BitCoin price formation. *Applied Economics*, Vol 48, Issue 19, pp. 1799-1815.
- https://en.wikipedia.org/wiki/Commodity_currency#:~:text=A%20commodity%20currency%20is%20a,Tanzania%2C%20Papua%20New%20Guinea).

Issue 3

- **Higher sensitivity** of bitcoin price in response to change in bitcoin demand due to the **inelastic supply** of bitcoin



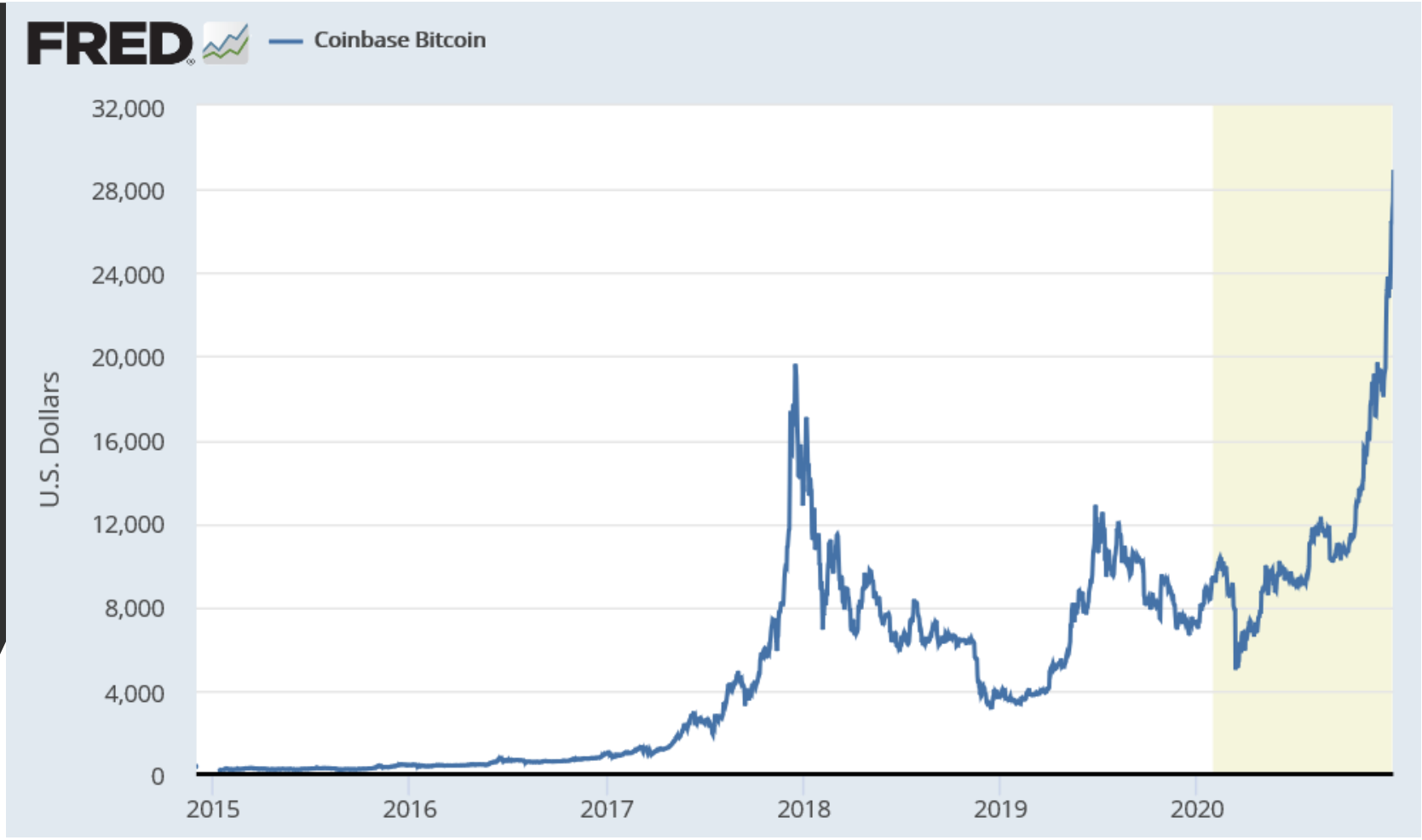
- Putnam, B. and Norland, E. (2018, April 24) *An In-Depth Look at the Economics of Bitcoin*. Retrieved from https://www.cmegroup.com/education/featured-reports/an-in-depth-look-at-the-economics-of-bitcoin.html

Bitcoin Price - An Overview

Bitcoin2021年1月初創下4.2萬美元紀錄新高後，持續受壓，近日在3萬美元大關附近徘徊。

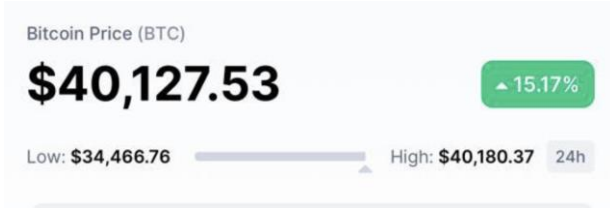
馬斯克Twitter簡介改為Bitcoin 比特幣一小時漲6000美元,爆升18%。

- Frequently significant rises and falls
- Bitcoin price has been highly volatile since it became popular in late 2017

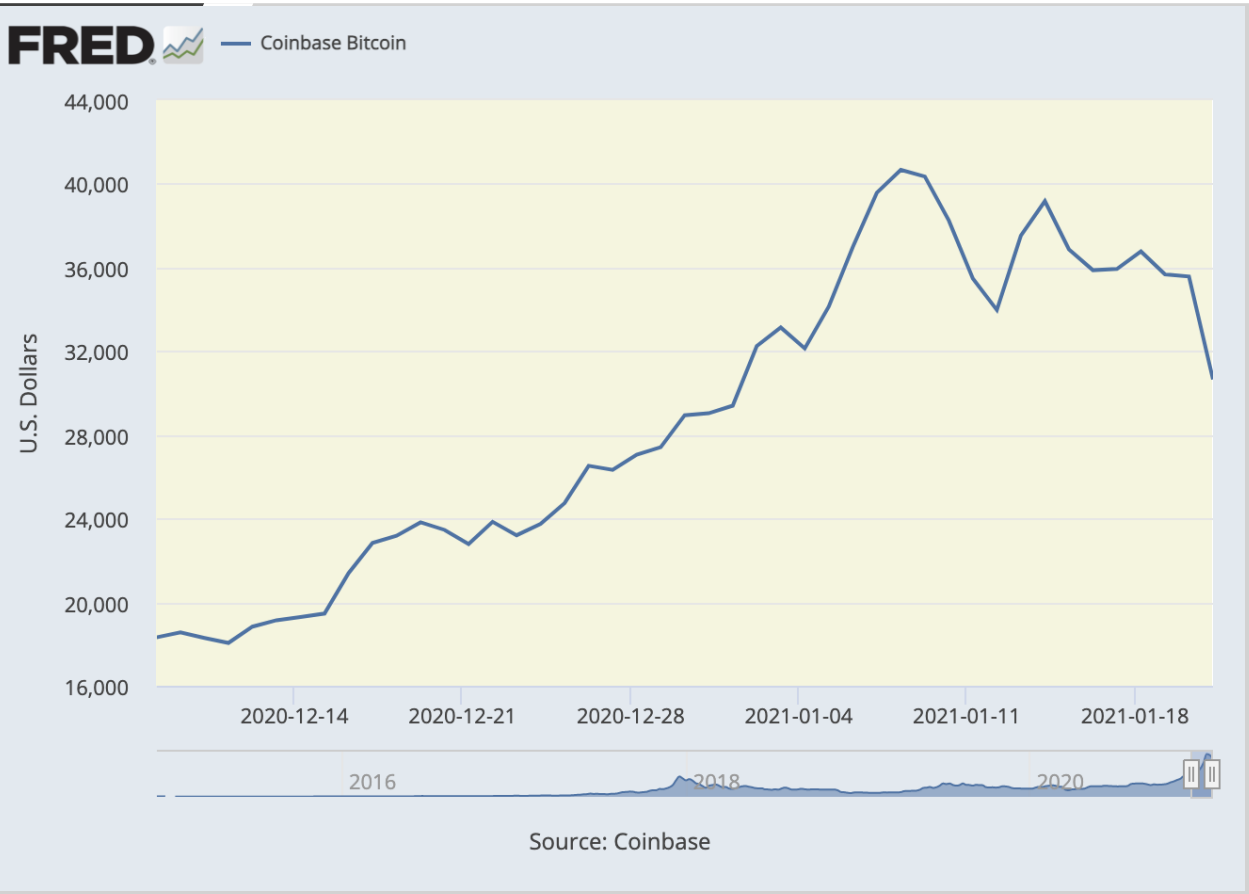


Bitcoin Price - April 2013 to December 2020 (Source: Source: Federal Reserve Bank of St. Louis)

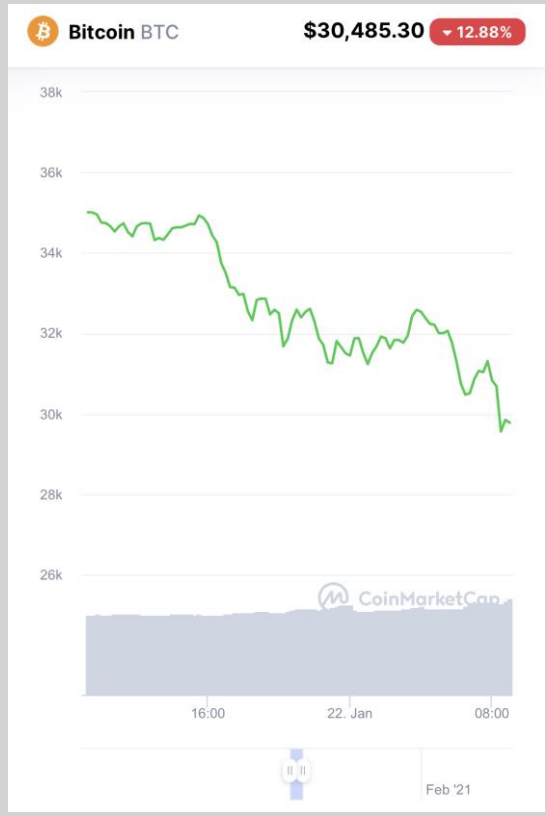
Bitcoin Price - Volatility



Bitcoin Price – Jan 8, 2021 24H (Source: CoinMarketCap)



Bitcoin Price – Jan 12, 2021 24H (Source: CoinMarketCap)



Bitcoin Price – Jan 22, 2021 24H (Source: CoinMarketCap)

Bitcoin Price – 9 DEC 2020 to 21 JAN 2021 (Source: Source: Federal Reserve Bank of St. Louis)

Bitcoin Price - An Overview

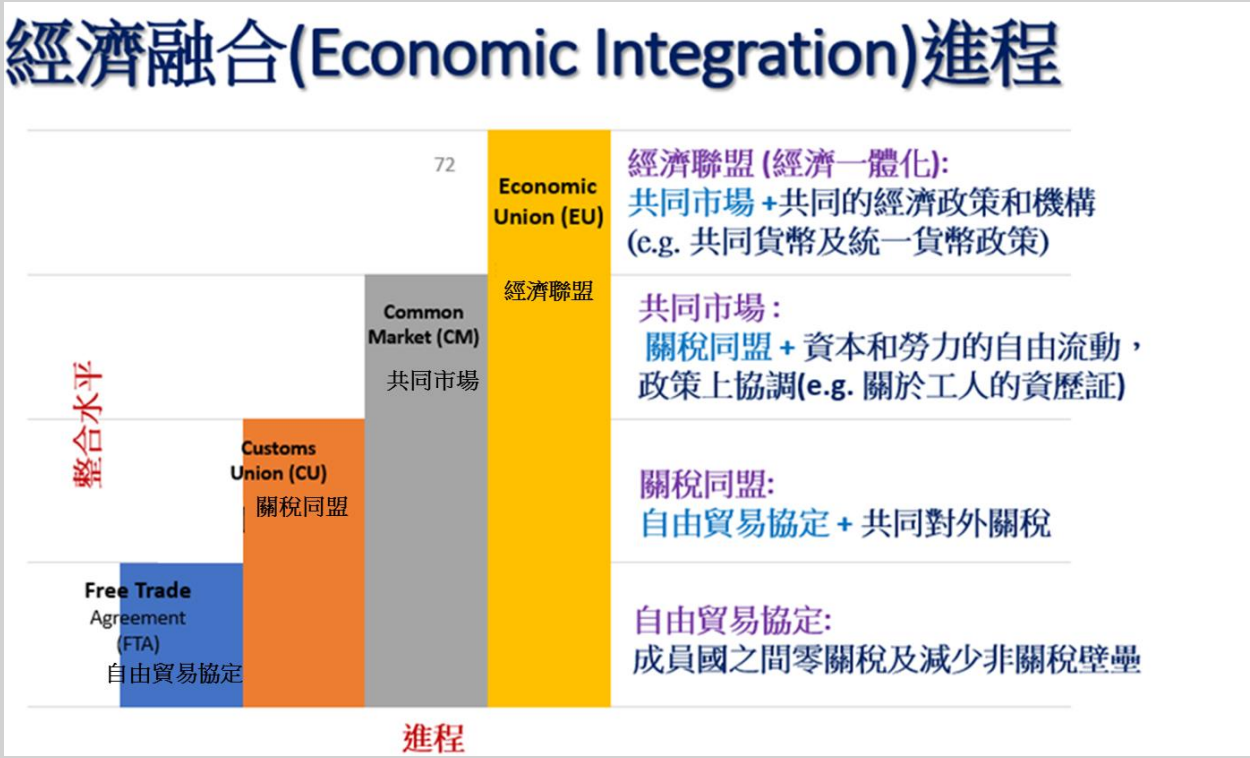
2020-12-14

- It is reported that a man killed his family members and tried to commit suicide due to loss in bitcoin trading in a volatile market.

https://www.hk01.com/%E5%A4%A7%E5%9C%8B%E5%B0%8F%E4%BA%8B/561416/

Issue 4

- it could be problematic for bitcoin to be used as **a shared common currency** by different countries, for this **skips** a few important steps in the normal **economic integration** process (**European Union – Euro**)



Cryptocurrencies & National Security Risks

- Bitcoin is an experimental digital currency
- As cryptocurrencies become more widely adopted, it's more viable for cryptocurrencies with better anonymity and security to be used to **support illegal activities**, such as terrorist operations. ➔ Dilemma ???

Note:
Cryptocurrencies are not **anonymous.** All Bitcoin transactions are stored publicly and permanently on the network. Anyone can see the balance and transactions of any Bitcoin address. Bitcoin addresses should only be used once.

…南韓金融安全研究所主管**Kwak Kyoung-ju** 說。之所以會鎖定這款**2014**年誕生的門羅幣（**Monero**），是因為門羅幣具有隱私性、安全性極高的特性，非常適合用來洗錢跟藏匿…，截至**2017**年，門羅幣是全球交易量排行第六的加密貨幣，市值超過**3**億美元。

➔ **Dilemma ???**

https://www.bnext.com.tw/article/47658/north-korean-hackers-hijack-computers-to-mine-cryptocurrencies

The FBI is Worried Criminals Might Use the Private Cryptocurrency Monero

https://www.coindesk.com/fbi-concerned-about-criminal-use-of-private-cryptocurrency-monero

"Bitcoin is an **experimental** new currency that is in active development. Each improvement makes Bitcoin more appealing but also reveals **new challenges as Bitcoin adoption grows**. During these growing pains you might encounter increased fees, slower confirmations, **or even more severe issues. Be prepared for problems** and consult a technical expert before making any major investments, but keep in mind that nobody can predict Bitcoin's future. " Source: https://bitcoin.org/en/you-need-to-know

Bitcoin VS Traditional Currencies

Features	Traditional Currencies	Bitcoin
Form	Physical (or Digital)	Digital
Transaction Process	Involve financial intermediaries	Decentralized (no intermediaries)
Supply	Controlled by Central Banks	Controlled by Programs / Algorithms
Volatility	More stable value	Volatile value
Generally Accepted	Yes	No
Inflationary / Deflationary	Inflationary	Non-Inflationary / Deflationary
Chargeback	Possible	No. Irreversible

Bitcoin – Advantages and Disadvantages

Advantages

- **Fast** international payment speed (depending on transaction fees - 10 minutes to 1 hour)
- **Lower** transactions fees (than conventional payment systems, for international payments)
- Payment **Freedom** – anywhere, anytime

Disadvantages

- **Not widely accepted**
- **Not backed** by any bank or government
- **Very limited supply** - Deflation risks
- **Volatile** value
- Require a relatively high level of computer knowledge to understand and use bitcoin
- The bitcoin software is still under active and ongoing development

- Bitcoin Project (n.d.) *Frequently Asked Questions.* Retrieved from https://bitcoin.org/en/faq
- Decentralized, Peer-to-peer, Cryptocurrency (n.d.) Retrieved from https://cs.stanford.edu/people/eroberts/courses/cs181/projects/2010-11/DigitalCurrencies/disadvantages/index.html
- Yermack D. (2013) Is Bitcoin a Real Currency? An Economic Appraisal. Retrieved from https://www.nber.org/system/files/working_papers/w19747/w19747.pdf
- Coppola F. (n.d.) Pros and Cons of Bitcoin for International Payments. Retrieved from https://www.americanexpress.com/us/foreign-exchange/articles/bitcoin-a-part-of-the-international-payments-landscape/

Latest Development in Digital Currencies

- Bitcoin's **inflexibility** in its supply, volatile prices, and the lack of general acceptance are its major drawbacks.
- **Stablecoin** is a cryptocurrency **pegged** to **fiat** money, other cryptocurrency, or exchange-traded commodities (such as precious metals)" to minimize the volatility of the price of the stablecoin, relative to some "stable" asset or basket of assets.
  - **No guarantee** that a stablecoin's value is indeed stable and a stablecoin owner must be able to redeem the coins for fiat money.
- **Libra** - **cryptocurrency** designed to have a more stable value**, as backed by reserves** of **cash or cash equivalents and assets of different currencies**.

- https://en.wikipedia.org/wiki/Stablecoin
- D. Bullmann, J. Klemm, and A. Pinna (2019) *In search for stability in crypto-assets: are stablecoins the solution?* Retrieved from https://www.econstor.eu/bitstream/10419/207616/1/1676933492.pdf
- Libra Association (2020) Libra White Paper v2.0 https://libra.org/en-US/white-paper

Latest Development in Digital Currencies

- **Synthetic central bank digital currency** (sCBDC) - stablecoin providers to **fully back coins with central bank reserves**. Thus, the **central bank** can continue to provide trust and efficiency and the stablecoin providers can focus on innovation and customer experience.
- Many **central banks** have also been researching on issuing their **state-run digital currency, or Central Bank Digital Currency (CBDC).**
  - **China's sovereign digital currency, Digital Currency Electronic Payment (DCEP),** is already in the testing phase.

- Adrian, T. and Mancini-Griffoli T. (2019) From Stablecoins to Central Bank Digital Currencies. *IMFBlog* Retrieved from https://blogs.imf.org/2019/09/26/from-stablecoins-to-central-bank-digital-currencies/
- Bank For International Settlements (2018) *Central bank digital currencies*. Retrieved from https://www.bis.org/cpmi/publ/d174.pdf
- Dimitrov, B. (2020, April 16) These Chinese Blockchain Platforms Are Launching Soon, Here Is Why. *Forbes* https://www.forbes.com/sites/biserdimitrov/2020/04/16/these-chinese-blockchain-platforms-are-launching-soon-here-is-why/#1d9b2f35207e

國際清算銀行BIS行長警告

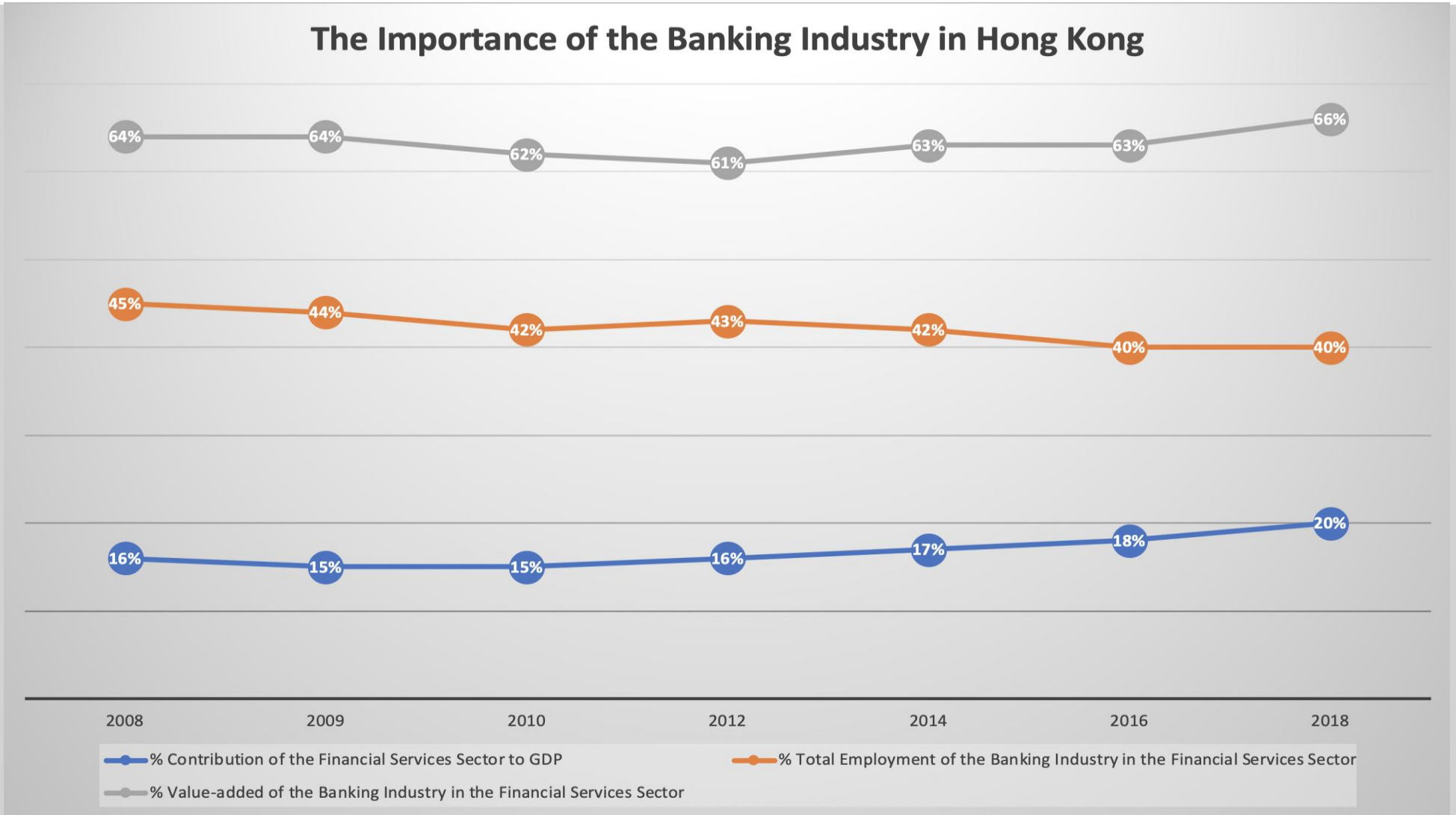
Bitcoin或會徹底崩潰　稱數字貨幣應由央行發行

- 比特幣有與生俱來的風險性，只有央行才應該發行數字貨幣。
- 投資者必須意識到比特幣很可能會徹底崩潰，因為當系統接近2,100萬枚比特幣的最大供應量時，它會變得很容易受到很多人的攻擊。
- 穩定幣（Stable Coins），例如Facebook最初提出、並由傳統貨幣支持的穩定幣的問題在於，**由私人實體負責維持資產支持**，這**引發了治理問題**。
- 然而，受到科技進步和**疫情影響，加速了電子支付轉變**，世界各地的央行都在測試數字貨幣的使用。國際清算銀行也建立了研究中心來調查這個問題。
- 「穩健的貨幣對我們的市場經濟至關重要，而央行擁有得天獨厚的條件來提供這種貨幣。如果需要數字貨幣，央行應該是發行方。」

Source of the picture and news: HK01: 2021-01-28

Virtual Banking

- In 2018, the **financial services sector** contributed around **20%** GDP of HK; and
- the **banking industry** accounted for **40% and 66%** respectively of the total **employment and value-added** in respect of the **entire financial services sector**.



Fintech

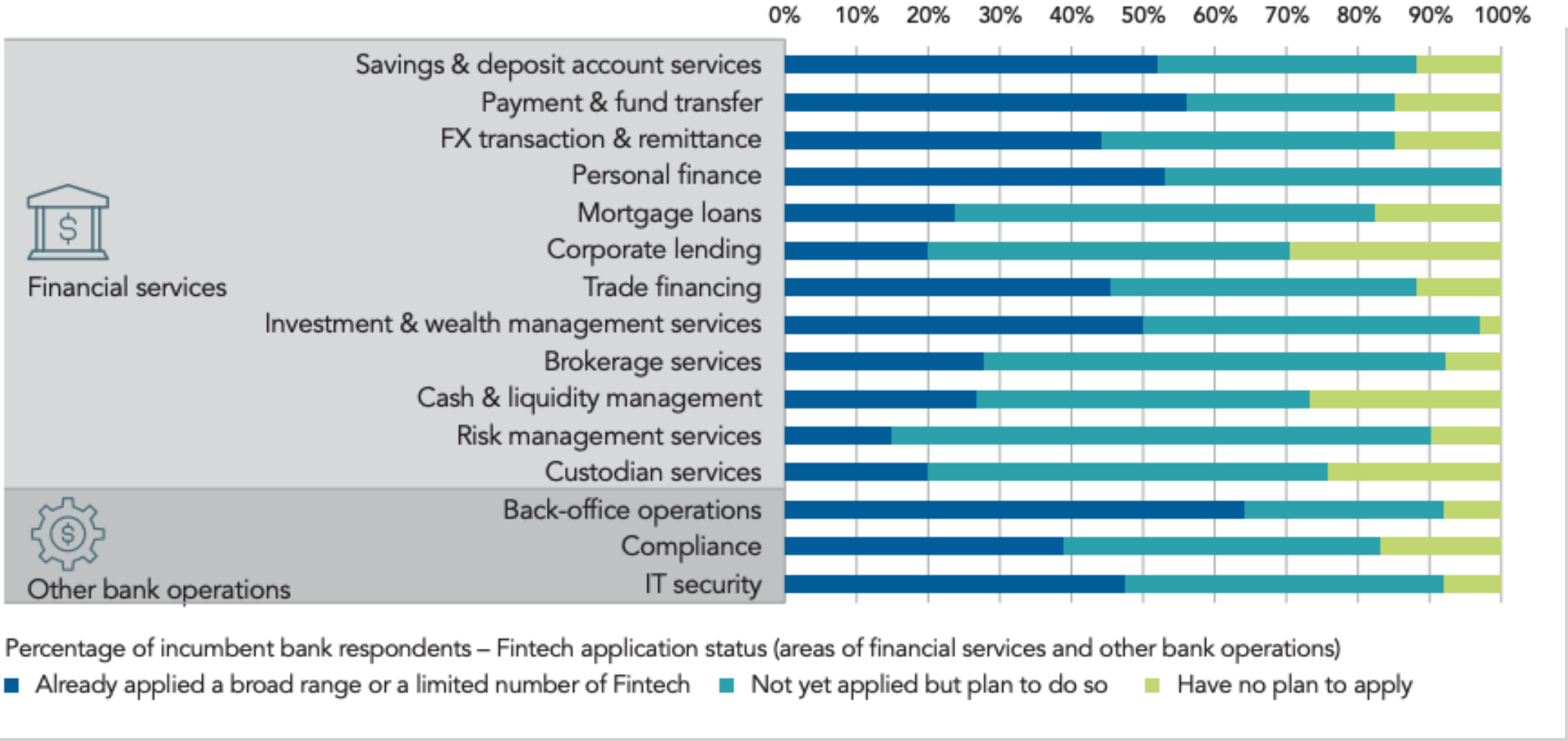
- **Financial Technology**, or FinTech, is an emerging **sub-sector** within the **financial services industry** that **uses technology to support or provide financial services**. **Innovative techniques** are used to replace or support traditional processes.
- "While the term fintech may carry different meanings, it is now commonly considered to cover the **application** of **artificial intelligence, blockchain, cloud computing, and big data** in areas such as payments, clearing and settlement, deposits, lending and capital raising, insurance, investment management, and market support." (HKMA)
- The recent **development of fintech** in Hong Kong – the introduction of **virtual banks**.
- **Virtual banks** are characterized by their very **high fintech** adoption rate.
- Virtual banks are more eager to **apply** most of these **innovations** in almost all the services they plan to offer.

Virtual Banks

- Virtual banks are banks which primarily deliver retail banking services through the internet or other forms of electronic channels instead of physical branches.

Source: Figure captured from SCMP
https://www.scmp.com/business/companies/article/3021123/hongkongers-are-reaping-benefits-virtual-banks-even-their-launch

FinTech Application Status by **Incumbent Banks** in Hong Kong (Source: HKIMR)



- Hong Kong Institute for Monetary and Financial Research (2020) *FINTECH Adoption and Innovation in the Hong Kong Banking Industry.* Retrieved from https://www.aof.org.hk/docs/default-source/hkimr/applied-research-report/fintechrep.pdf

Virtual Banks – the timeline

Timeline

March 2016

- HKMA established the **Fintech Facilitation Office (FFO)** to facilitate the healthy development of the ecosystem of fintech in Hong Kong and promotes Hong Kong as a fintech hub in Asia.

September 2017

- The HKMA announced **several initiatives** to prepare Hong Kong to move into a new era of **Smart Banking.**
- Helping the banking industry to capture the opportunities brought about by the introduction of virtual banks is one of the important initiatives to promote Smart Banking.
- the convergence of banking and technology

Virtual banks - the timeline

30 May 2018

- The HKMA published a revised *Guideline* on Authorization of Virtual Banks (Guideline) to facilitate the introduction of virtual banks.

2 Nov 2020

- Seven virtual banks have officially launched. These banks have attracted nearly 300,000 retail customers and taken in over US$1 billion in deposits.

- News.gov.hk (2020, November 2) Retrieved from https://www.news.gov.hk/eng/2020/11/20201102/20201102_105902_909.html

Virtual banks - the timeline

As of 30 November 2020, there were **8 virtual banks** in Hong Kong.

- AIRSTAR BANK LIMITED
- ANT BANK (HONG KONG) LIMITED
- FUSION BANK LIMITED
- LIVI VB LIMITED
- MOX BANK LIMITED
- PING AN ONECONNECT BANK (HONG KONG) LIMITED
- WELAB BANK LIMITED
- ZA BANK LIMITED

- Hong Kong Monetary Authority (2020) *Virtual Banks.* Retrieved from https://www.hkma.gov.hk/eng/key-functions/banking/banking-regulatory-and-supervisory-regime/virtual-banks/

Virtual Banks VS Incumbent banks

- Virtual banks deliver all services via the internet
  - For example, **account opening** could be done **any time** in a day by scanning one's ID card and face in addition to submitting other required personal information in a mobile app. The whole process may take **less than 10 minutes.**
- They **do not impose minimum balance requirements** or low-balance fees on customers ➔ promote financial inclusion
- Without the costs of operating retail physical branches, the cost of operations could be lowered

Virtual Banks VS Conventional Banks - Key Differences

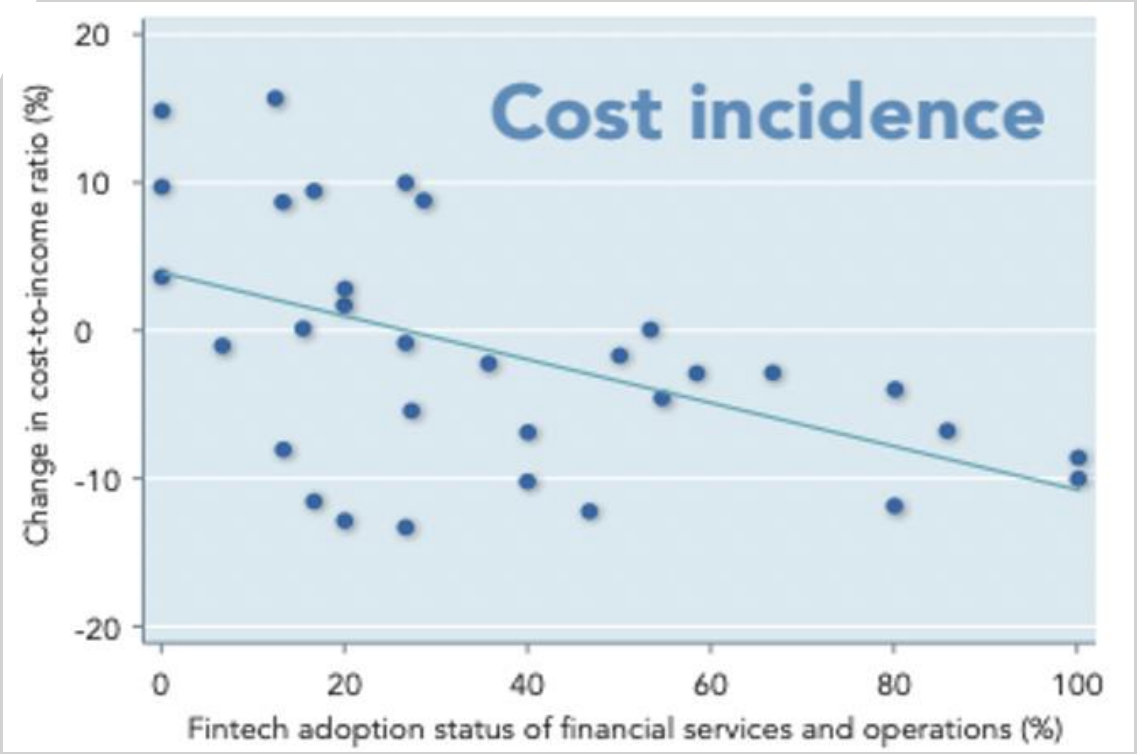
	Virtual Banks	Conventional Banks
Scope of services	Mainly retail banking	Full range of banking services
Target customers	Mainly retail clients (including SMEs)	All types of clients
Service Channels	Electronic channels (via internet) only	Both physical branches and electronic channels
Minimum Balance Requirements / Low-balance Fees	None	At the discretion of the bank

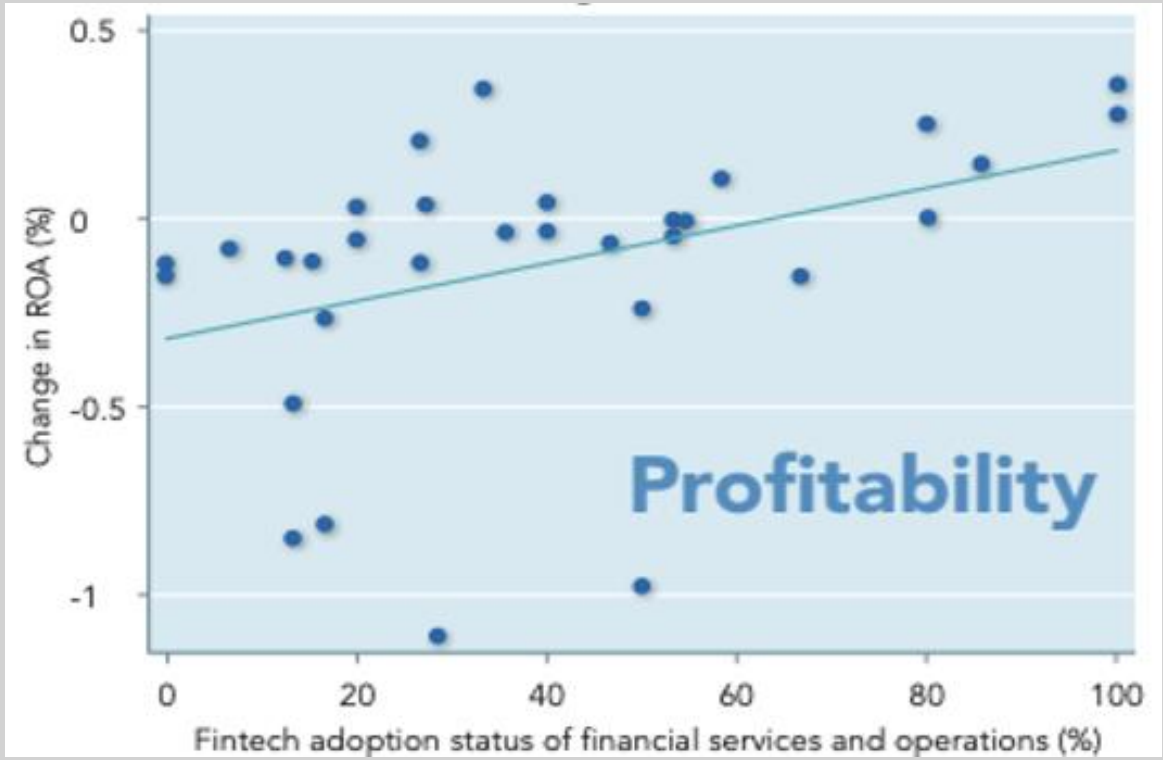
- Investor and Financial Education Council (2018, February 6) *Guideline on Authorization of Virtual Banks* Retrieved from https://www.info.gov.hk/gia/general/201802/06/P2018020600504.htm

- Investor and Financial Education Council (n.d) *How does a virtual bank differ from a conventional bank?* Retrieved from https://www.ifec.org.hk/web/en/financial-products/fintech/virtual-bank/difference-virtual-from-conventional-bank.page

FinTech and Productivity

- Preliminary findings of recent research suggest that the adoption of Fintech has positive effects on banks' performance.





Source: Hong Kong Institute for Monetary and Financial Research **(2020)** *FINTECH Adoption and Innovation in the Hong Kong Banking Industry*

FinTech and Productivity

- The banking industry has been one of the key drivers of the productivity growth of Hong Kong.
- In 2000 – 2013, the measure of total factor productivity (TFP) increased 2.7% on average. Banks' TFP growth has remained highly resilient and contributed stably to the overall TFP growth of the economy.

	TFP growth (%)		
	2000-2008	2009-2013	2000-2013
Overall	**4.0**	**2.6**	**2.7**
of which:			
I/E trade	**9.3**	**6.1**	**6.6**
Financial	**6.3**	**1.3**	**4.2**
Banking	5.1	5.0	5.2
Non-bank financial	11.6	-7.1	3.7
Wholesale, retail, restaurant & hotel	**1.4**	**7.1**	**2.5**
Wholesale & retail	2.8	9.1	4.4
Restaurant & hotel	0.1	2.6	0.1

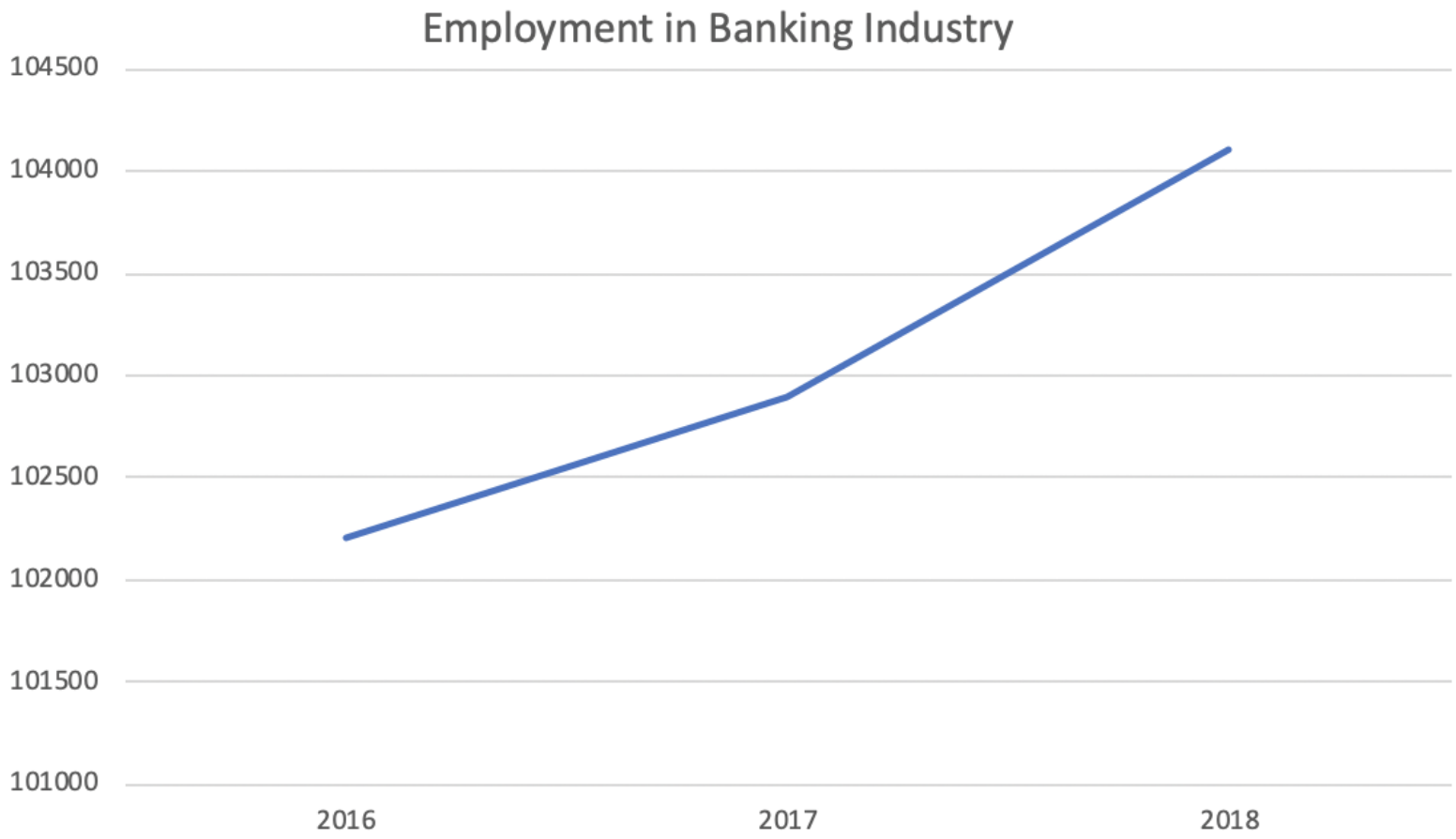
Note: Compound annual growth rates are used. In this table, the TFP growth rates of the financial sector and the wholesale, retail, restaurant and hotel sector are estimated by first grouping the inputs and outputs in their subsectors. The insurance sector is not shown here as its contribution to overall TFP growth is small.
Source: HKMA staff estimates.

TFP Growth of Major Economic Sector (Source: HKMA)

- Hong Kong Monetary Authority (2016) *PRODUCTIVITY GROWTH IN HONG KONG: SECTORAL PATTERNS AND DRIVERS.* Retrieved from https://www.hkma.gov.hk/media/eng/publication-and-research/research/research-notes/RN-02-2016.pdf

FinTech and Employment

- As one of the pillars in the Hong Kong economy, the banking sector contributed to around 3% (104,100 persons) of total employment in Hong Kong in



(Source: Census and Statistics Department of the HKSAR)

FinTech and Employment

- The bank sector would require higher level of professionalism and demand more high-skilled workers
- On the other hand, manpower requirements for education level below first degree are projected to be decreasing

Education level	Actual manpower requirements in 2017		Projected manpower requirements in 2027		Projected change from 2017 to 2027	Projected average annual rate of change (2017 – 2027)
	Number	% share	Number	% share		
Lower secondary and below	1 300	1.2	800	0.7	- 500	- 5.2%
Upper secondary	26 100	24.7	15 200	13.4	- 10 900	- 5.3%
Diploma	1 800	1.7	1 000	0.9	- 800	- 5.5%
Sub-degree	5 000	4.7	4 500	4.0	- 400	- 0.9%
First degree	53 000	50.1	67 400	59.6	+ 14 500	+ 2.4%
Postgraduate	18 500	17.5	24 200	21.4	+ 5 700	+ 2.7%
All levels	**105 600**	**100.0**	**113 200**	**100.0**	**+ 7 500**	**+ 0.7%**

Note: Individual figures may not add up to the totals due to rounding.

Manpower Requirements of the Banking Sub-sector by Education Level in 2017 and 2027 (Source: Census and Statistics Department of the HKSAR)

Thank you!