Cryptocurrency Investing

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Outline

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- Bitcoin Characteristics
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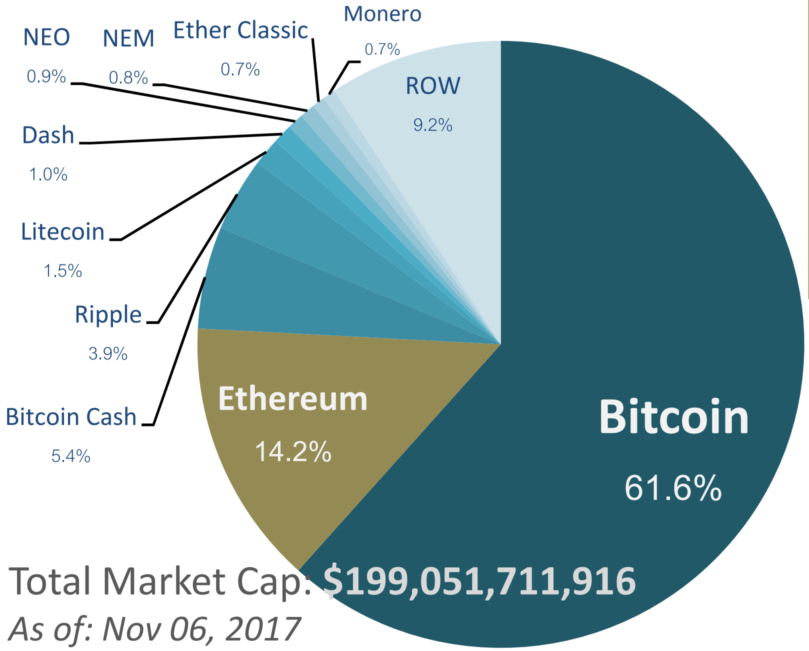
Introduction to Cryptocurrency: Bitcoin (1)

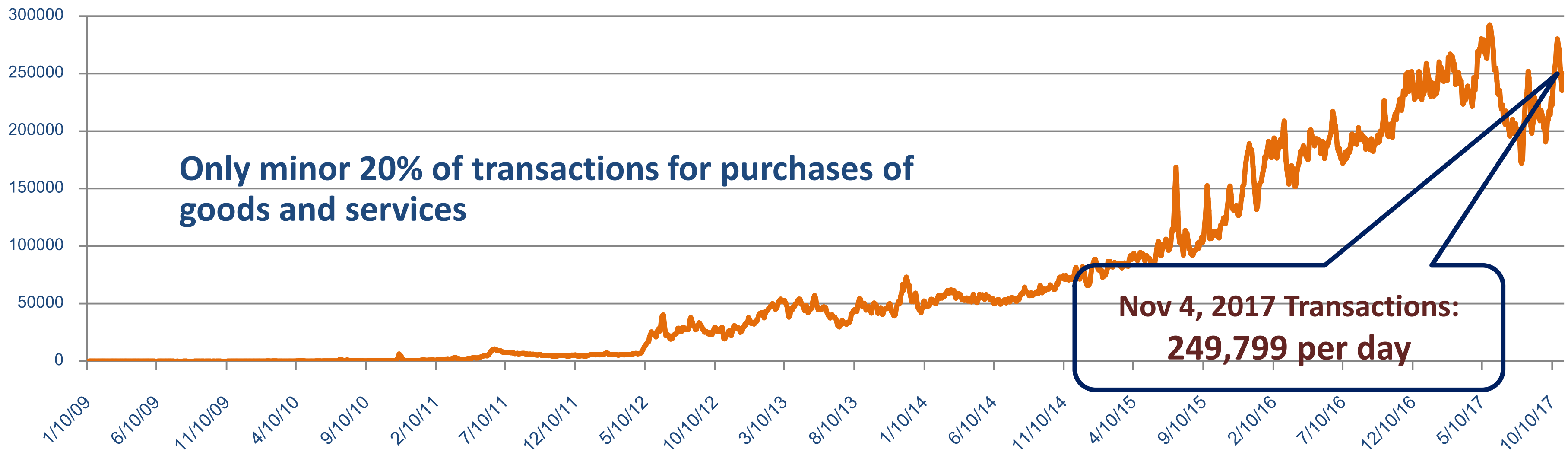


Total Market Cap: $199,051,711,916

As of: Nov 06, 2017

A virtual currency is *"a type of unregulated digital money which is issued and controlled by its developers and used and accepted among the members of a specific virtual community"* (European Central Bank, 2012:13)

- Bitcoin was invented by Satoshi Nakamoto (2009)
- Smallest Unit: 1e-8 called 1 Satoshi
- BTC in circulation is now (Nov 10, 2017) approx. 16.67 mln (max. 21 mln in 2140) and FX rate 6,748 USD



Introduction to Cryptocurrency: Bitcoin (2)

Varieties of Business accept Bitcoin

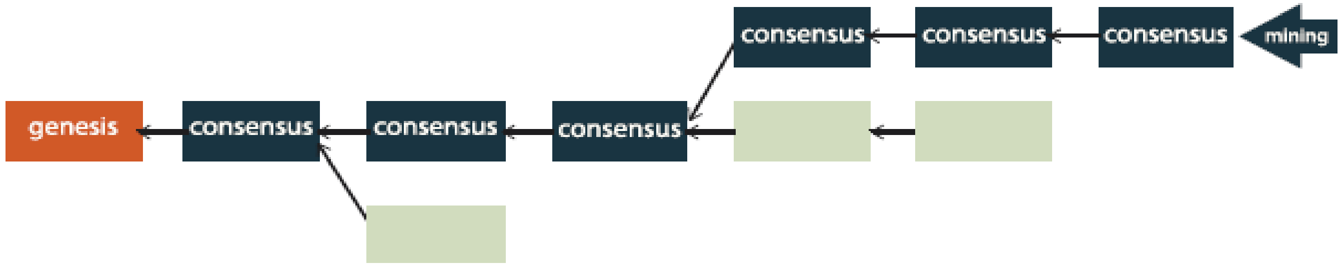
- **Pembury Tavern** – A pub in London, England
- **Old Fitzroy** – A pub in Sydney, Australia
- **The Pink Cow** – A diner in Tokyo, Japan
- **The Pirate Bay** – BitTorrent directories
- **Zynga** – Mobile gaming
- **4Chan.org** – For premium services
- **EZTV** – Torrents TV shows provider
- **Mega.co.nz** – The new venture started by the former owner of MegaUpload Kim Dotcom
- **Lumfile** – Free cloud base file server – pay for premium services
- **Etsy Vendors** – 93 of them
- **PizzaForCoins.com** – Domino's Pizza signed up – pay for their pizza with bitcons
- **Whole Foods** – Organic food store (by purchasing gift card from Gyft)
- **Bitcoincoffee.com** – Buy your favorite coffee online
- **Grass Hill Alpacas** – A local farm in Haydenville, MA
- **Jeffersons Store** – A street wear clothing store in Bergenfield, N.J
- **Helen's Pizza** – Jersey City, N.J., you can get a slice of pizza for 0.00339 bitcoin by pointing your phone at a sign next to the cash register
- **A Class Limousine** – Pick you up and drop you off at Newark (N.J.) Airport

https://99bitcoins.com/who-accepts-bitcoins-payment-companies-stores-take-bitcoins/

Introduction to Cryptocurrency: Bitcoin (3)

Mechanism

Example abstract **Blockchain**




```
{"hash":"00000000000000f38...",
 "prev_block":"00000000000000c6d...",
 "time":1354114900,
 "difficulty":436527338,
 "nonce":282240624,
 "tx":[
   {"hash":"5ca...",
     "in":[
      {"prev_out":
        {"hash":"000...",},
      }
     ],
     "out":[
      {"value":"50.53620000",
       "scriptPubKey":"27a1..."
      }
     ]
   },
   ...
 ]
}
```

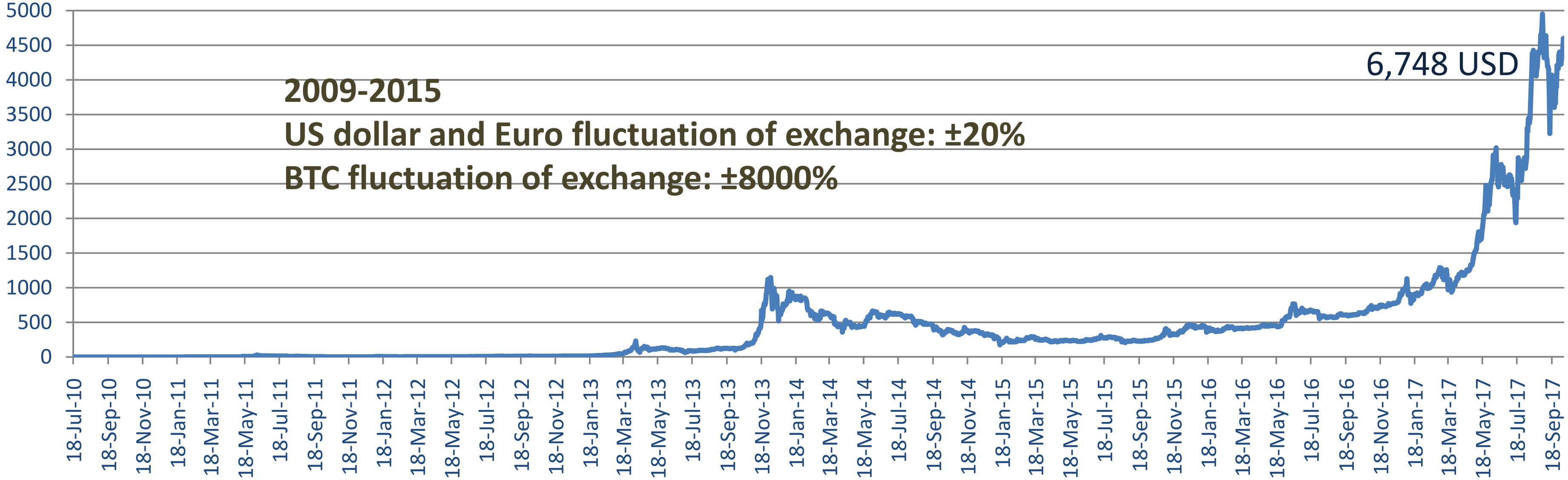

JavaScript of **Blockchain**

- Miner: provide computing power, verify and record payments
- Mining: solving complex math puzzles
- Online Wallets (e.g. personal computer , Smartphone)
- Public and Private key
- Control the Creation And Exchange: the principles of cryptography
- Cryptographically Secure
- Decentralized peer-to-peer [digital] payment network
- Bitcoin is based on and backed by mathematics
- Called ***Blockchain***

Cryptocurrency: Bitcoin Characteristics

Its Price and Volatility

BTCUSD



Three types of drivers determining Bitcoin price development:

(i) Supply and Demand,

(ii) Attractiveness and

(iii) Global macroeconomic and financial developments.

Price will be mainly driven by speculative investments

Cryptocurrency: Is Bitcoin a currency?

	Advantage of BitCoin	Disadvantage of BitCoin
Medium of exchange	Transaction costs	
	Anonymity and privacy	
		Not legal tender and difficulty to procure BitCoins
	Learning spillover effect	Fixed costs of adoption
		Network externalities
		Dispute resolution not available
		Absence of BitCoin denominated credit
Unit of account	Divisibility	Relative price comparability problem
		Price volatility
Store of value	Non-inflationary supply	Deflationary pressure
		Cyber security

* The most prominent example is the collapse of the largest BitCoin exchange, MtGox, in February 2014 allegedly leading to a loss of 850 thousand BitCoins (Böhme et al. 2015; Yermack 2014).
* Moore and Christin (2013) find that 45% of the total studied BitCoin exchanges closed down, and 46% of the exchanges that closed did not reimburse any claims to consumers.

In summary, **several characteristics identified impede it use as a currency** due to negative assessment above

Source: [5]

Cryptocurrency: Bitcoin Around the World

An example of Bitcoin Around the World and Thailand

- Germany: Private Currency
- Brazil: Virtual Currency
- Singapore is treated BTC as product.
- The United Kingdom, Canada, and Finland have decided to apply capital gains taxes on Bitcoin gains
- SEC (USA): warning investors against investing and becoming involved in Bitcoin Fund
- China and France: report denying Bitcoin
- BOT: BTC is not a currency by laws and users must take risk by yourself.
- Illegal activities: criminals, drug addicts, terrorist groups, Internet gambling
- In 2014, ISIS, a terrorist group, began to encourage donations in the form of crypto currencies such as Bitcoin

Conclusions: BTC Advantages and Disadvantages
(Cryptocurrency and Traditional Currency)

Advantages	Disadvantages
Low Transaction Cost	Relatively high fixed costs of adoption
High Anonymity And Privacy	Absence of a legal tender attribute
Learning Spillover Effects	Difficulty to procure
No Inflationary Pressures	Dependence on network externalities
Infinite Divisibility (1e-8)	Absence of an institution enforcing dispute resolution
Saves costs related to the production, transportation, and handling	**Extremely high price volatility**
Short execution time	**Issues with cyber security**
Reduce opportunities for theft, such as bank robbery	

Price will be mainly driven by speculative investors. Several negative assessment that impede it use as a currency.

BTC as New Asset Class

Investment Portfolio with New Asset Class

Data Simulation and Scenario Generation

- 1403 time series data with daily asset price
- Covers a period of time between 4 Jan 2012 to 6 Oct 2017
- Number Simulations: 1000
- Short Sell is not allowed
- Each port. will generate 10 sub-portfolio given by risk tolerance.
- Portfolio selection by risk-adjusted return
- MATLAB Financial Toolbox
- Historical Data as follows

2 Portfolio Allocations:
1st : Portfolio with BTC
2nd : Portfolio without BTC

BTCUSD	BTCUSD Exchange Rate
MSCIworld	A market cap weighted stock market index
SETTRI	SET Total Return Index
TBDC10Y	Thai Government Bond YTM 10Ys
USDTHB	USDTHB Exchange Rate

α-CVaR Portfolio Optimization

$$\text{Minimize} \sum_{i=1}^{n} X_i^2 \sigma_i^2 + \sum_{\substack{i=1 \\ i \neq j}}^{n} \sum_{j=1}^{n} X_i X_j \sigma_{ij}$$

$$\text{s.t. } (1) \sum_{i=1}^{N} X_i = 1$$

$$(2) X_i \geq 0 \;\; for\, all\, i$$

$$(3) \sum_{i=1}^{N} (X_i \bar{R}_i) = \bar{R}_p$$

$$(4) CVaR_\alpha \leq v$$

Minimize Risk

Where α = 0.95

Investment Portfolio with New Asset Class

Numerical Results and Conclusions (1)

0.95 CVaR Portfolio Optimization

Subject to	**Number Scenarios**	1000	**Data**	4 Jan 2012 to 6 Oct 2017
	Probability Level	0.95		
	Initial Port. Weight	0		

SCENARIO

Case 1

	Port. No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Annualize Return,%	0.19	15.40	30.61	45.82	61.03	76.24	91.45	106.66	121.87	137.08
	Annualize Risk,%	1.10	11.19	24.76	39.44	55.38	72.25	89.37	106.62	124.20	142.02
	Risk-adj. return	0.17	1.38	1.24	1.16	1.10	1.06	1.02	1.00	0.98	0.97
Weighting	**BTCUSD**	0.00	0.07	0.16	0.27	0.39	0.51	0.63	0.75	0.88	1.00
	MSCIworld	0.00	0.20	0.33	0.16	0.00	0.00	0.00	0.00	0.00	0.00
	SETTRI	0.01	0.22	0.43	0.58	0.61	0.49	0.37	0.25	0.12	0.00
	TBDC10Y	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	USDTHB	0.02	0.51	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Case 2

	Port. No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Annualize Return,%	0.16	1.64	3.12	4.60	6.08	7.56	9.04	10.52	12.00	13.48
	Annualize Risk,%	1.10	2.30	4.01	5.78	7.57	9.77	12.43	15.26	18.16	24.32
	Risk-adj. return	0.15	0.71	0.78	0.80	0.80	0.77	0.73	0.69	0.66	0.55
Weighting	**MSCIworld**	0.01	0.06	0.11	0.16	0.21	0.25	0.30	0.34	0.39	0.00
	SETTRI	0.01	0.06	0.12	0.17	0.23	0.32	0.41	0.51	0.60	1.00
	TBDC10Y	0.97	0.72	0.47	0.24	0.00	0.00	0.00	0.00	0.00	0.00
	USDTHB	0.01	0.15	0.30	0.43	0.56	0.42	0.29	0.15	0.02	0.00

Investment Portfolio with New Asset Class

Numerical Results and Conclusions (2)

- BTC Portfolio is recommended to high risk tolerance investors.
- Case 1 improve comparatively performance due to new asset class approach.
- And BTC low correlation with other asset classes
- The percentage of investment portfolio to each asset should be in BTCUSD, MSCIworld, SETTRI and USDTHB with 7, 20, 22 and 51 respectively.
- So far, high historical average return, but meanwhile it moves sideway.
- Therefore, strategic allocation by forced diversification (i.e. Bound BTC 20-70% port. weight)

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THANK YOU FOR YOUR ATTENTION

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