

Cryptocurrency Investing

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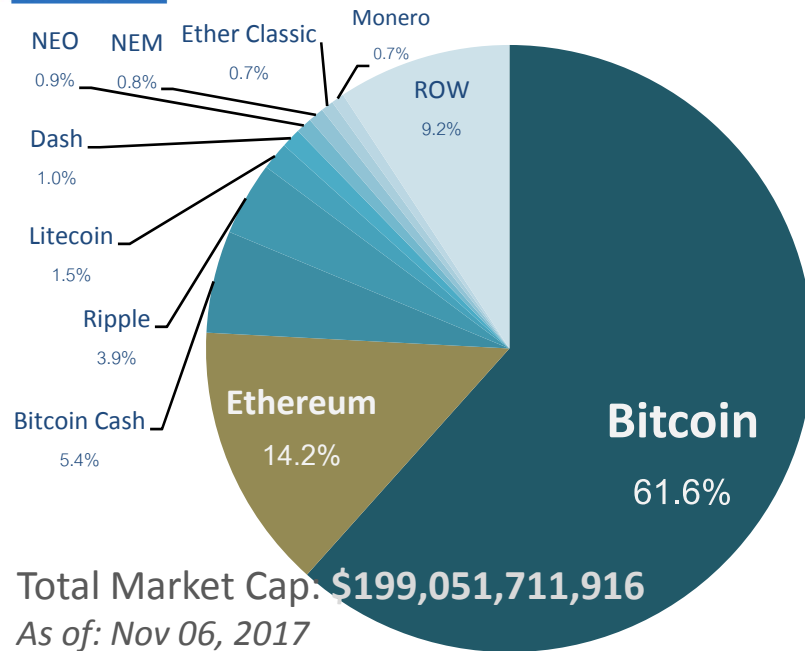
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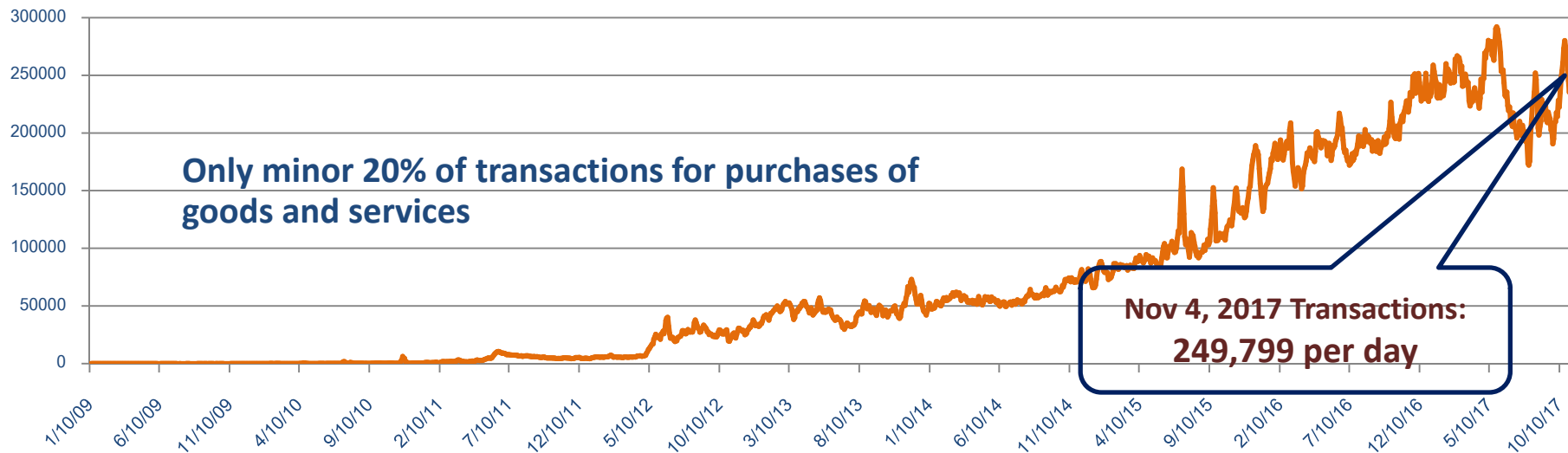


Introduction to Cryptocurrency: Bitcoin (1)



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

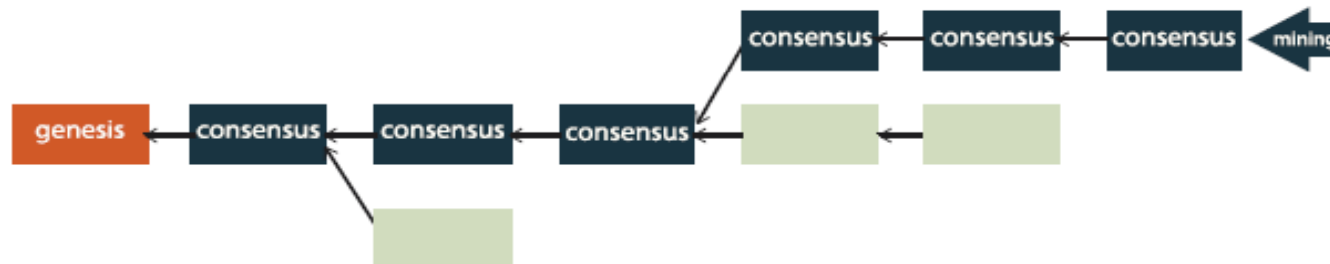
<https://99bitcoins.com/who-accepts-bitcoins-payment-companies-stores-take-bitcoins/>



Introduction to Cryptocurrency: Bitcoin (3)

Mechanism

Example abstract **Blockchain**



```
{
  "hash": "000000000000000f38...",
  "prev_block": "00000000000000c6d...",
  "time": 1354114900,
  "difficulty": 436527338,
  "nonce": 282240624,
  "tx": [
    {
      "hash": "5ca...",
      "in": [
        {
          "prev_out": {
            "hash": "000...",
          }
        }
      ],
      "out": [
        {
          "value": "50.53620000",
          "scriptPubKey": "27a1..."
        }
      ]
    },
    ...
  ]
}
```

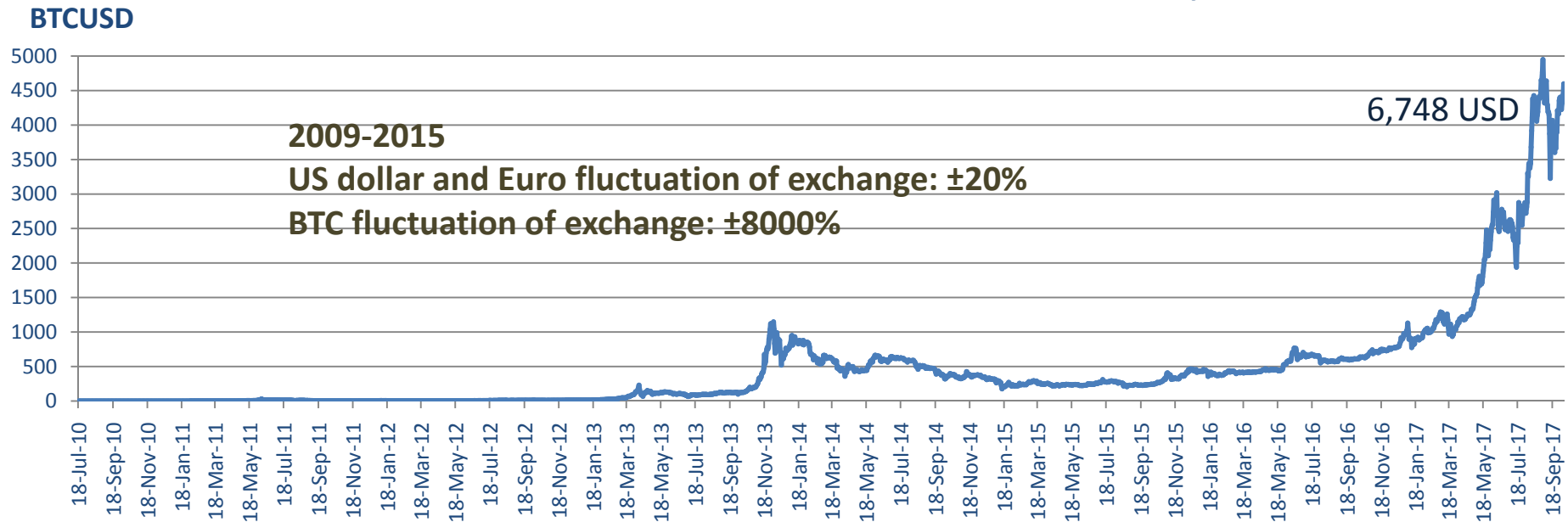
JavaScript of **Blockchain**

- 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



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 Learning spillover effect	Not legal tender and difficulty to procure BitCoins Fixed costs of adoption Network externalities Dispute resolution not available Absence of BitCoin denominated credit Relative price comparability problem
Unit of account	Divisibility	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 its use as a currency** due to negative assessment above



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
MSCIworld
SETTRI
TBDC10Y
USDTHB

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



Investment Portfolio with New Asset Class

Theory and Model Description

α -CVaR Portfolio Optimization

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

Minimize Risk

Where $\alpha = 0.95$

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

$$(2) X_i \geq 0 \text{ for all } i$$

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

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



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		



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 sideways.
 - Therefore, strategic allocation by forced diversification (i.e. Bound BTC 20-70% port. weight)



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THANK YOU FOR YOUR ATTENTION

Q & A

