

Bitcoin and Cryptocurrency Technologies

Lecture 1: Economics and History

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Economic concepts and properties of money

- **Money** is any item or verifiable record that is generally accepted as payment for goods and services
- **Durable** - able to retain its value over time
- **Portable** - easy to transport in sufficiently large quantities
- **Divisible** - can be divided into smaller quantities to represent whole range of value
- **Fungible** - two units of the same nominal value must be equally valuable
- **Scarce** - it must be very hard to increase the supply
- **Recognizable** - it must be easy to find peers willing to accept it as payment

Money before Bitcoin

- Seashells
- Silver
- Gold
- Paper money
- Fiat money

Centralized electronic money 1/2

- Traditional electronic money - centrally managed ledgers (bank databases)
- Transactions within a single bank - changes to the client's balance in the bank database
- Transactions between banks - communication between banks that aggregate payments between clients of different banks (e.g. SWIFT)

Centralized electronic money 2/2

- In most cases government is the central entity controlling monetary supply
- Assumption that government is competent enough to “manage” the economy
- Government can inflate fiat currency, effectively extracting resources from **all** its people without their consent
- Exclusive control over money is the ultimate tool of controlling people for totalitarian regimes

Decentralized electronic money

- Is it possible to eliminate central management?
- **Byzantine Generals Problem** - how can three generals agree on when to attack if they don't trust each other?
- **How can multiple parties come to a consensus without having to trust each other?**

Cypherpunk movement

- Widespread use of strong cryptography and privacy-enhancing technologies as a route to social and political change
- **Can we use strong cryptography to solve BGP and create a decentralized monetary system?**
- Several attempts:
 - David Chaum - DigiCash, 1989
 - Wei Dai - b-money, 1998
 - Nick Szabo - Bit Gold, 1998
 - Adam Back - Hashcash, 1997-2002

Satoshi Nakamoto and Bitcoin Genesis 1/3

- Financial crisis of 2007-2008
- On October 31, 2008, pseudonymous person **Satoshi Nakamoto** published a whitepaper titled "Bitcoin: A Peer-to-Peer Electronic Cash System"
- In late 2008 - early 2009, Nakamoto contacted Wei Dai, Adam Back and Hal Finney about the electronic cash system he was working on
- On January 3, 2009, Nakamoto released version 0.1 of the Bitcoin software and launched the network by mining the **genesis block**

Satoshi Nakamoto and Bitcoin Genesis 2/3

Bitcoin Genesis Block

Raw Hex Version

00000000	01 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00000010	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00000020	00 00 00 00 3B A3 ED FD	7A 7B 12 B2 7A C7 2C 3E;ÉíÝz{.²zÇ,>
00000030	67 76 8F 61 7F C8 1B C3	88 8A 51 32 3A 9F B8 AA	gv.a.È.Ã^ŠQ2:Ÿ,ª
00000040	4B 1E 5E 4A 29 AB 5F 49	FF FF 00 1D 1D AC 2B 7C	K.^J)«_IÿŸ...¬+
00000050	01 01 00 00 00 01 00 00	00 00 00 00 00 00 00 00
00000060	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00
00000070	00 00 00 00 00 00 FF FF	FF FF 4D 04 FF FF 00 1DÿŸŸŸM.ÿŸ..
00000080	01 04 45 54 68 65 20 54	69 6D 65 73 20 30 33 2F	..EThe Times 03/
00000090	4A 61 6E 2F 32 30 30 39	20 43 68 61 6E 63 65 6C	Jan/2009 Chancel
000000A0	6C 6F 72 20 6F 6E 20 62	72 69 6E 6B 20 6F 66 20	lor on brink of
000000B0	73 65 63 6F 6E 64 20 62	61 69 6C 6F 75 74 20 66	second bailout f
000000C0	6F 72 20 62 61 6E 6B 73	FF FF FF FF 01 00 F2 05	or banksÿŸŸŸ..ð.
000000D0	2A 01 00 00 00 43 41 04	67 8A FD B0 FE 55 48 27	*....CA.gŠŸ°pUH'
000000E0	19 67 F1 A6 71 30 B7 10	5C D6 A8 28 E0 39 09 A6	.gñ q0·.\Ö"(à9.
000000F0	79 62 E0 EA 1F 61 DE B6	49 F6 BC 3F 4C EF 38 C4	ybaë.aÞ¶Iö&?Lİ8Ä
00000100	F3 55 04 E5 1E C1 12 DE	5C 38 4D F7 BA 0B 8D 57	óU.â.Á.Þ\8M+ø..W
00000110	8A 4C 70 2B 6B F1 1D 5F	AC 00 00 00 00	ŠLp+kñ._¬....

Satoshi Nakamoto and Bitcoin Genesis 3/3

- Satoshi Nakamoto continued Bitcoin development until mid-2010, when he transferred control over the repository to Gavin Andersen
- On April 26, 2011, Nakamoto wrote his last known email to Gavin Andersen, and never appeared online since
- The Bitcoin software written by Satoshi Nakamoto is the basis for the Bitcoin Core project
(<https://github.com/bitcoin/bitcoin>)

Bitcoin invention

- Cryptographic Proof of Work system solves the generalized Byzantine Generals Problem, eliminating the need to trust anyone on the network
- **Bitcoin is decentralized money**
- Transaction scripting system provides flexibility for more complex use cases than simple value transferring
- **Bitcoin is programmable money**

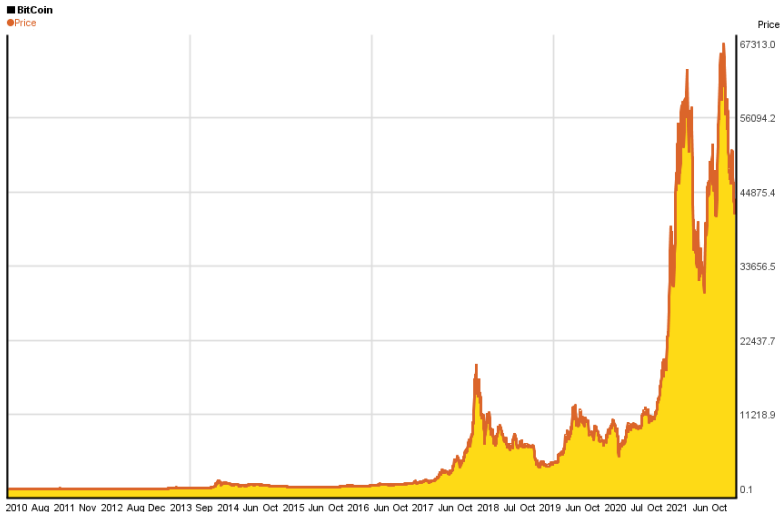
Market acceptance

- In 2010, the first known commercial transaction using bitcoin occurred when programmer Laszlo Hanyecz bought two Papa John's pizzas for 10,000 BTC
- In 2011, Bitcoin becomes accepted as donations by Electronic Frontier Foundation and WikiLeaks
- In 2011, price went from \$0.30 to \$5.27
- In 2012, from \$5.25 to \$13.30
- In 2013, from \$13.30 to \$770
- On February 8, 2021, bitcoin price is \$38831.60

Market acceptance 1/2

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Market acceptance 2/2



Additional resources

- <https://www.activism.net/cypherpunk/manifesto.html> - Cypherpunk Manifesto
- <https://unenumerated.blogspot.com> - Nick Szabo's Blog
- The Bitcoin Standard: The Decentralized Alternative to Central Banking, 2018 - Saifedean Ammous
- Human Action: A Treatise on Economics, 1949 - Ludwig von Mises

The end

Thank you!