

Proof of Work

Source

Beyond the doomsday
economics of “proof-of-
work” in cryptocurrencies

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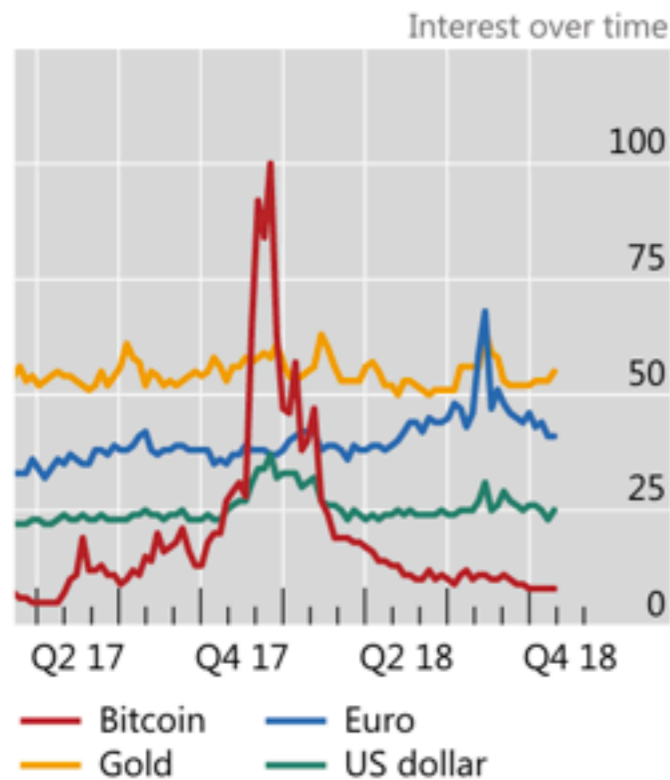
<https://www.bis.org/publ/work765.pdf>

Interest in Bitcoin

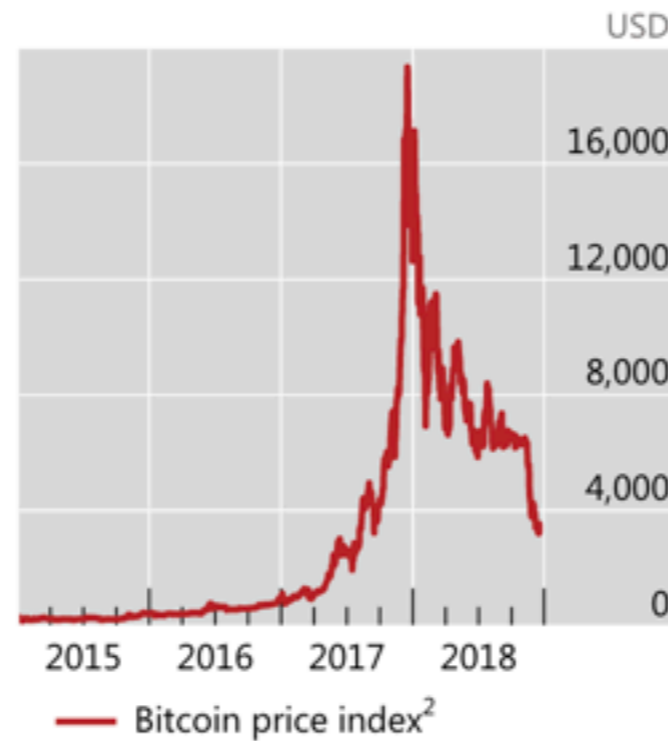
Global interest in Bitcoin, valuations, and use in retail payments

Graph 1

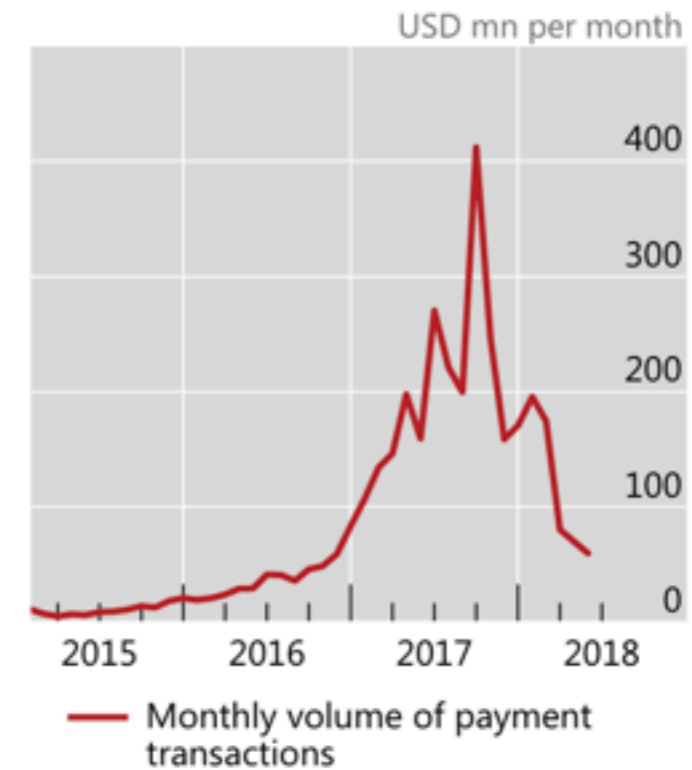
Interest in Bitcoin has exceeded that of sovereign currencies and gold¹



Valuations have been on a roller coaster



Actual usage in retail payments remained small³

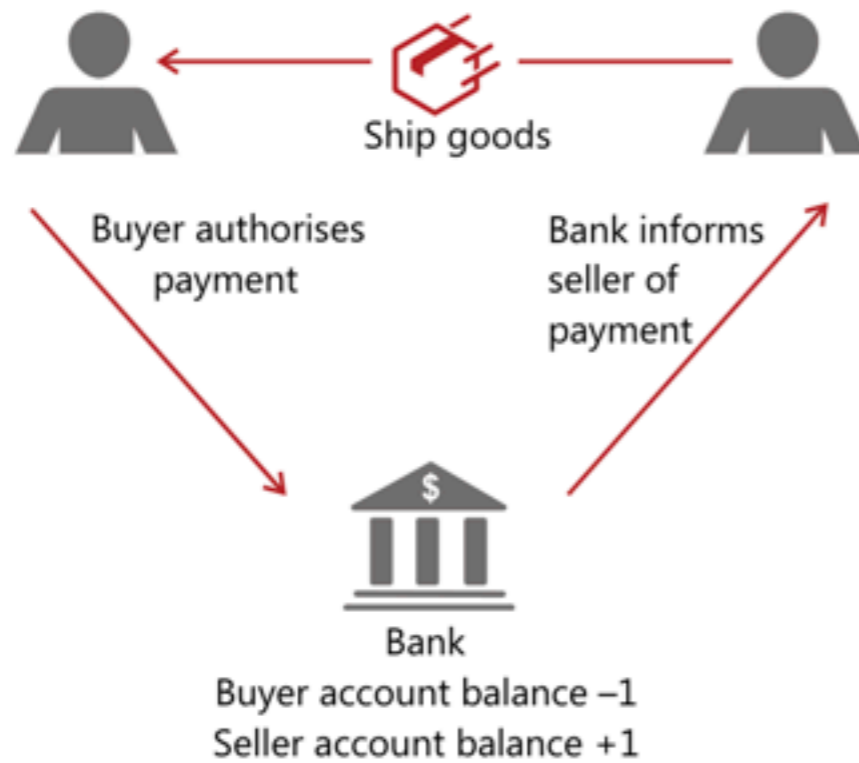


Making a Payment

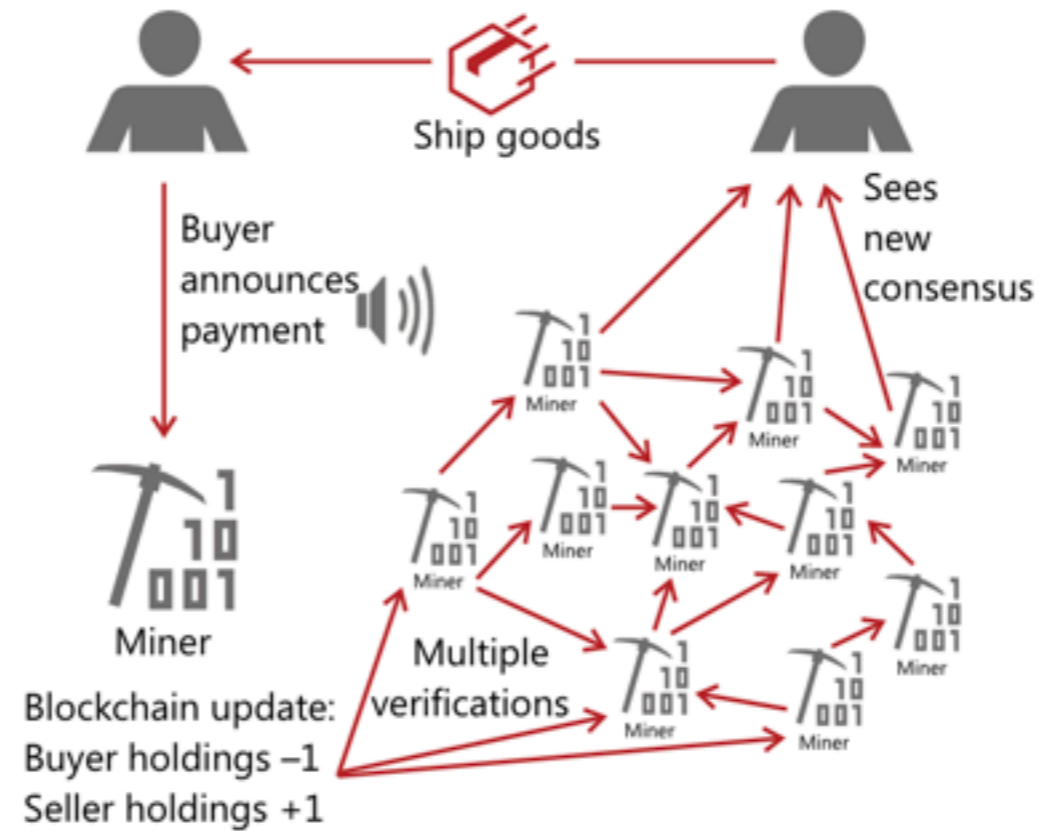
Making a payment transaction via a bank account and via Bitcoin

Graph 2

Centralised ledger (bank)



Distributed ledger (Bitcoin)

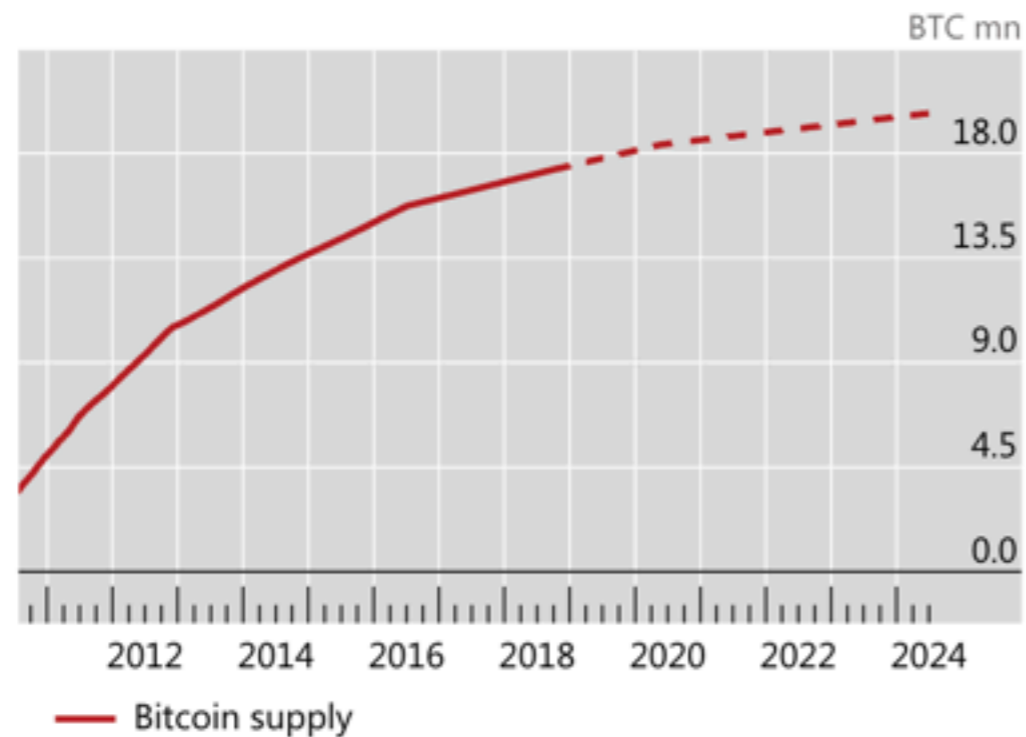


Rewards

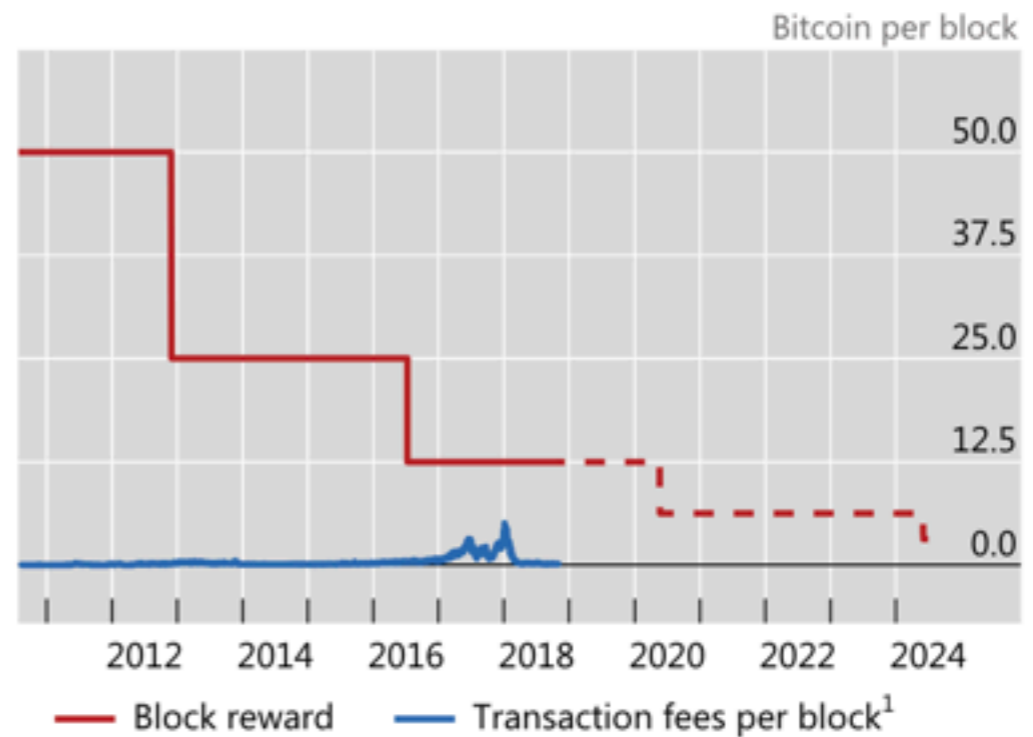
Block rewards, bitcoin circulation, and mining income

Graph 4

Bitcoins are brought into circulation via block rewards, but at a decelerating speed



Miners' income is made up of block rewards and transaction fees

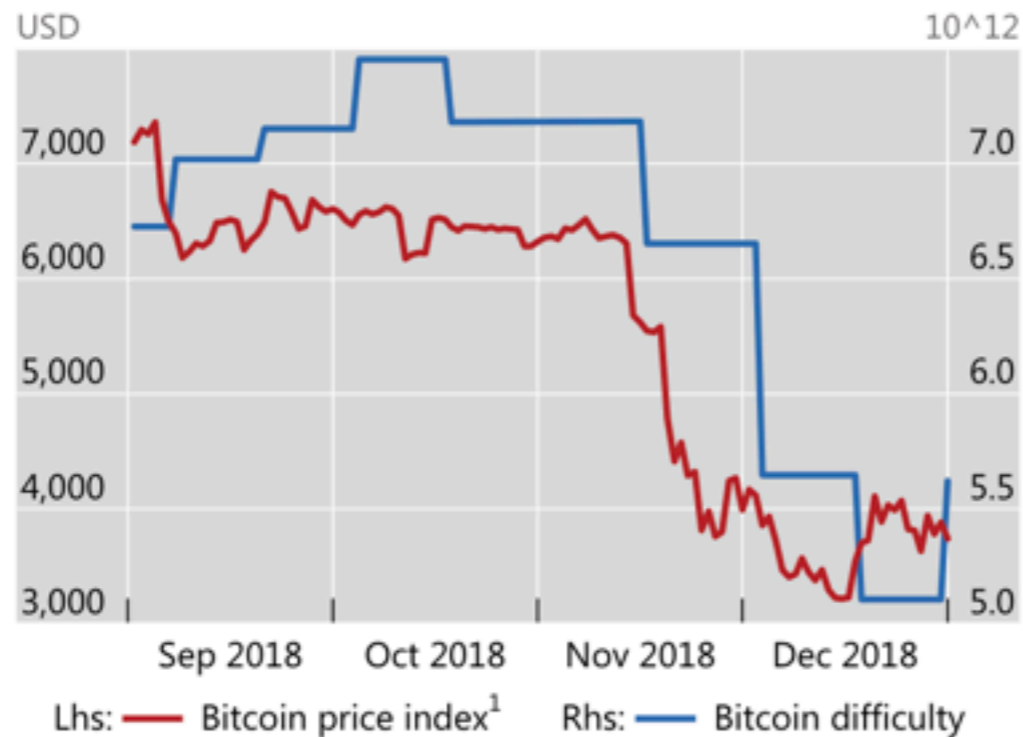


Difficulty

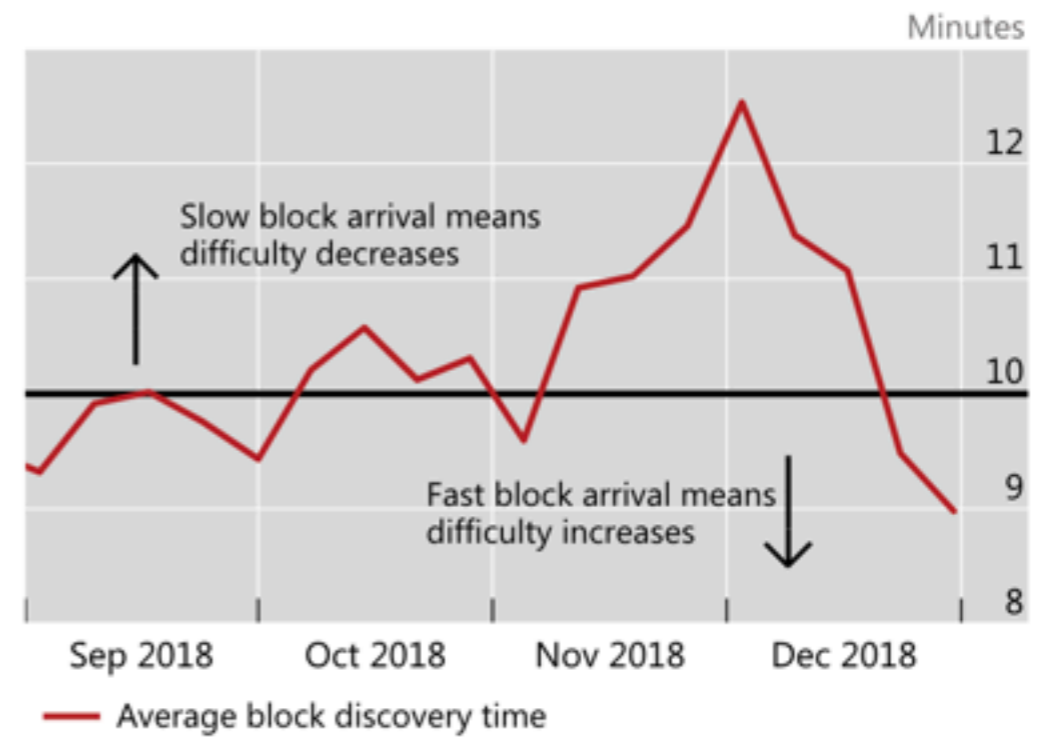
Bitcoin price developments, difficulty, and block discovery time during late 2018

Graph 5

Proof-of-work difficulty follows the USD price of bitcoin as...



... falling bitcoin prices cause miners to shut down equipment, resulting in fewer block discoveries, and thus a downward re-calibration of difficulty²



Cost of Mining

Overall hashing rate, equipment prices, and the cost of a large-scale attack

Graph 6

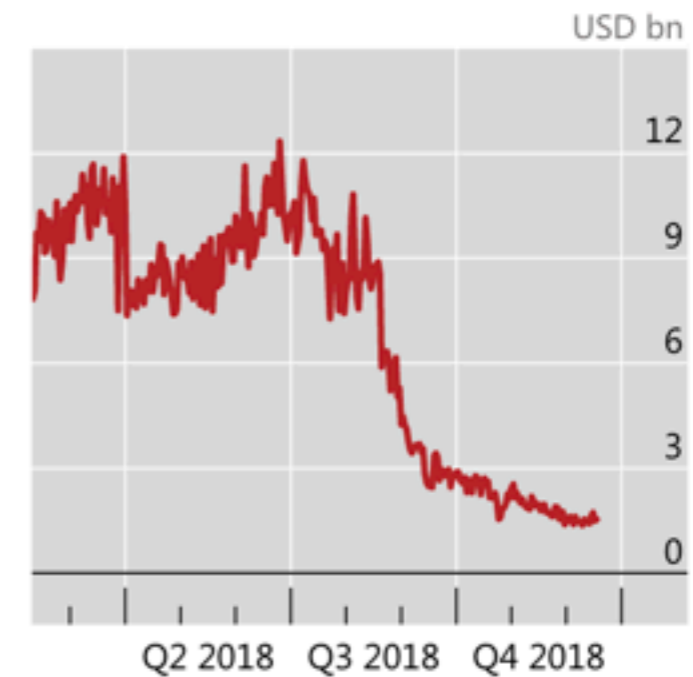
Total hashing rate of the Bitcoin network peaked in August 2018



The price of mining equipment dropped substantially¹



As a result, the cost of acquiring the network's hash rate collapsed²



— Hashrate

Transactions

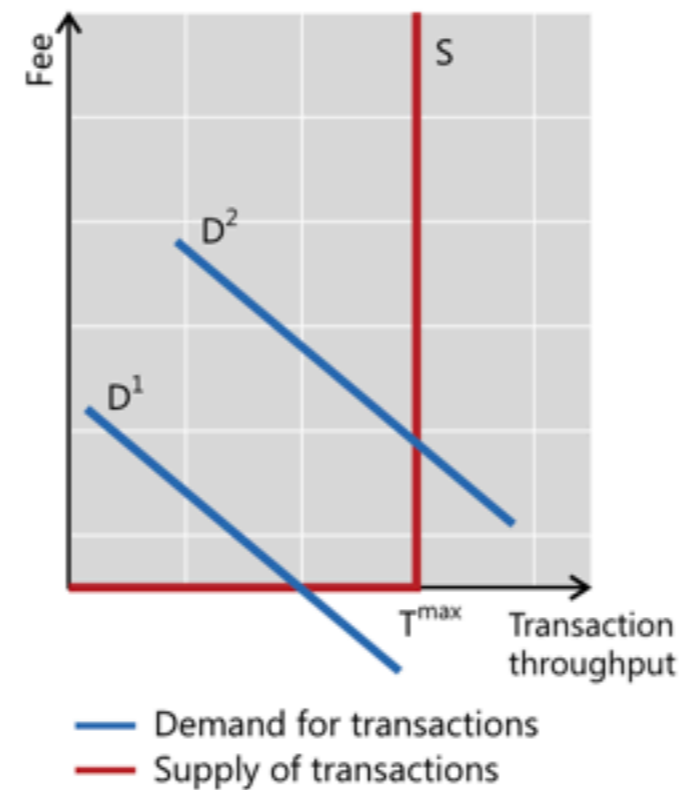
The market for Bitcoin transactions

Graph 7

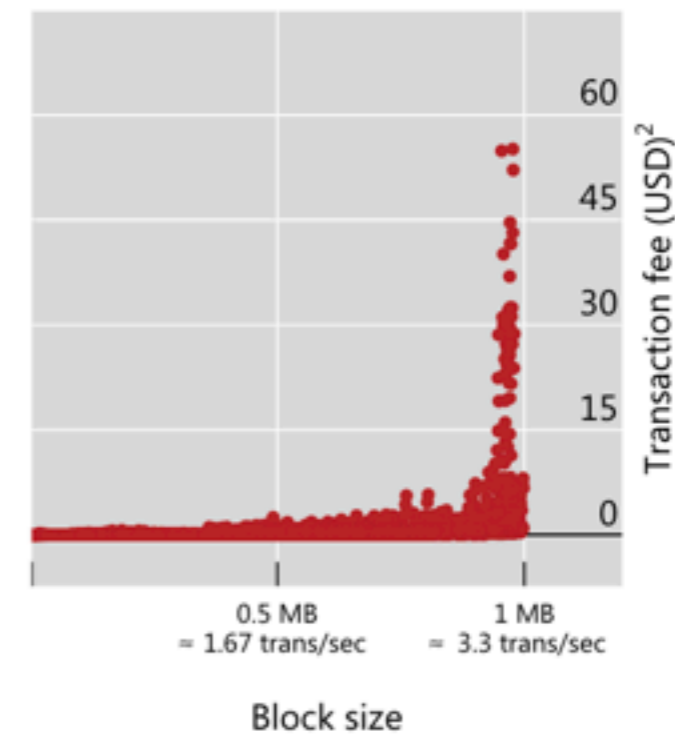
Transaction demand fluctuates widely¹



With capped supply, demand fluctuations shift fees only when blocks are full...



...which explains the kinked relationship between block size and fees



Congestion

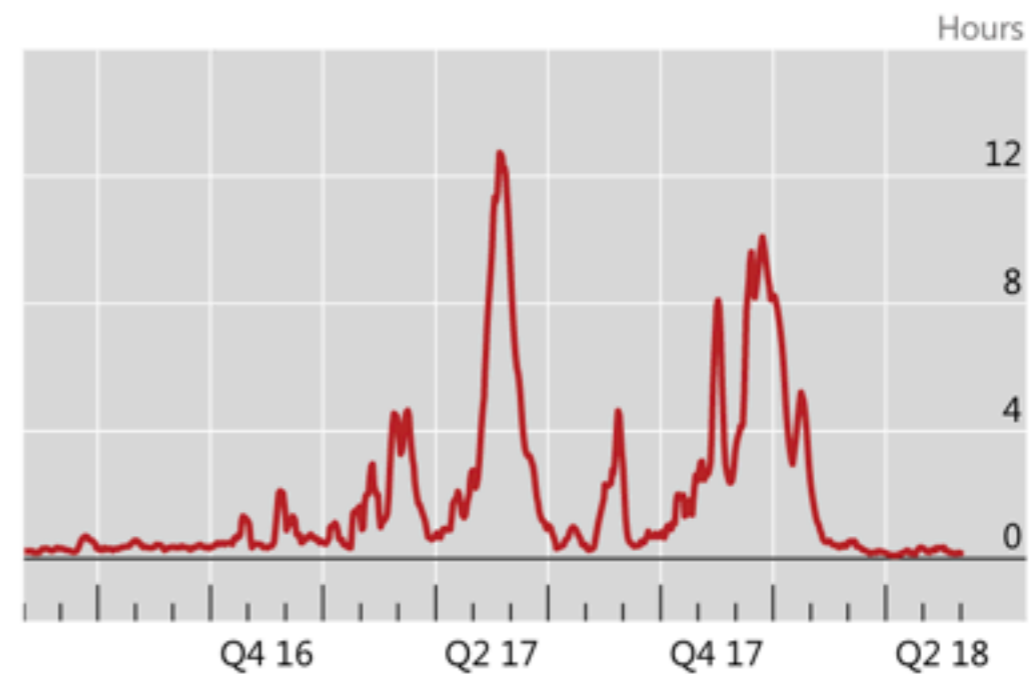
Spiking fees and congestion of the payment process

Graph 8

As fees spike...¹



... waiting times lengthen²



Extra Credit Quiz

▼ Assignment Quizzes



Quiz Ch 1

Available until Feb 12 | Due Jan 22 at 5:30pm | 20 pts | 5 Questions



Quiz Ch 2

Available until Feb 12 | Due Jan 29 at 5:30pm | 20 pts | 5 Questions



Quiz Ch 3

Available until Feb 12 | Due Feb 12 at 5:30pm | 20 pts | 5 Questions



Quiz Ch 4

Available until Feb 19 | Due Feb 19 at 5:30pm | 20 pts | 5 Questions



Bitcoin (extra credit)

Available until May 22 | Due May 22 at 11:59pm | 20 pts | 5 Questions

