Innovation and Cryptoventures

Cryptocurrencies

Campbell R. Harvey

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Investment Strategy Advisor, Man Group, plc

January 22, 2017
Blockchain Opportunities

http://www.slideshare.net/RedChip/btcs-201507

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### Long History of Digital Currency

Long History of Digital Currency

Paypal started in 1998 as a software security company for handheld devices.
Disruption 101

Western Union, we fixed your ad for you.

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Disruption 101

1. Money transfer network is $500 billion per year
2. Average fee=10%. Bitcoin 0.01%
3. Potential of $50b per year in hands to consumers
4. “Western Union and Moneygram will be the Kodaks of this decade”, Barry Silbert

See: http://www.mauldineconomics.com/lg/bitcoin
An Overview: Public Blockchains

Let’s initially focus on the first application of blockchain: Bitcoin

1. Peer to peer network
2. Triple entry accounting with common ledger that everyone shares called the blockchain
3. Introduces a protocol (rules for validating transactions) on the blockchain
4. Unit of account: bitcoin a cryptocurrency
An Overview: Public Blockchains

The history of all transactions contained in ledger called the blockchain

• Genesis block January 3, 2009
• Fixed number of bitcoin (production stops 2141)
• Bitcoin Foundation (standardizing, protecting and promoting bitcoin)
• The miners solve computationally intensive problems to ensure the security of the blockchain – the security of the mechanism is unprecedented
• The size of the Bitcoin blockchain is currently 90gb
An Overview: Public Blockchains

There are significant barriers to entry to understanding bitcoin

• These barriers to entry provide an opportunity for us that we will explore in this course
Solution

Any new product has to answer two questions:

1. What problem does this solve?
2. Is the problem economically important?
Solution

Consumers

• Transact without worrying about security practices of every merchant; no need for bank account; enables microtransactions; enables transfers of funds with minimal fees; worldwide use; ability to choose from full transparency to anonymity; immune to inflation;

Material drawn from Jameson Lopp, *The Multifaceted Nature of Bitcoin*
Solution

Merchants

• Saves on merchant transactions fees; gives customers an alternative way to transact; saves on need for security infrastructure; impossible to counterfeit; perfect transparency of all transactions

• Example, Gasoline sales in US about $500 billion in 2015 means $17.5 billion in credit card fees (assuming 50% of payments by credit card)

Material drawn from Jameson Lopp, The Multifaceted Nature of Bitcoin
Solution

Family

• Send remittances at minimal cost around the world

Material drawn from Jameson Lopp, *The Multifaceted Nature of Bitcoin*
Solution

People in risky countries

- Provides an alternative method to transact when a country is hit with hyperinflation

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http://krieger.jhu.edu/iae/economics/Venezuela_Enters_the_Record_Book.pdf
Solution

People in less developed countries

- Enables electronic transactions in areas that are not served by banks; also possible to save and store value; microtransactions
- You do not need a bank account. There are 2 billion unbanked persons.

Material drawn from Jameson Lopp, *The Multifaceted Nature of Bitcoin*
## Blockchain Venture Capital

<table>
<thead>
<tr>
<th>Close Date</th>
<th>Company</th>
<th>Classification</th>
<th>Round Size (Sm)</th>
<th>Cumulative Funding (Sm)</th>
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*Surge in Internal VC as companies make large internal investments

http://www.coindesk.com/bitcoin-venture-capital/

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Solution

Overstock’s t0 is first to transact stock on a blockchain

However, they spent more than $5 million in legal fees dealing with SEC and FINRA.

Solution

Blockchain and beyond

• New way to verify ownership
• New applications to financial instruments
• New ways to codify contracts, smart contracts ("if", "then" statements)
• Internet of Things
• Mesh networks/decentralized storage
• Supply chains
• New way to vote

Material drawn from Jameson Lopp, The Multifaceted Nature of Bitcoin
One Main Challenge is Lack of Understanding

President Obama at SXSW: “everybody’s walking around with a Swiss bank account in their pocket.”

This is a fundamental misperception.

http://fortune.com/2016/03/15/apple-iphone-swiss-bank/
One Main Challenge is Lack of Understanding

President Obama, at SXSW: “everybody’s walking around with a Swiss bank account in their pocket.”

This is more accurate!

http://fortune.com/2016/03/15/apple-iphone-swiss-bank/
Challenges

1. Cryptocurrencies are mainly used for criminal activity.
2. A lack of security plagues all cryptocurrencies.
3. Bubble because no fundamental value.
4. Mining is a waste of energy.
5. Cryptocurrencies are too small today to be an important economic force.
6. Cryptocurrencies are currently too volatile to serve as a store of value.
7. Cryptocurrencies are just another currency.
Cryptocurrencies:
Cryptocurrencies mainly used for criminal activity

- Silk Road: Amazon of black market – priced in bitcoin
Cryptocurrencies: 
...are mainly used for criminal activity

- Silk Road: Amazon of black market – priced in bitcoin
Cryptocurrencies:

Issues with cash – crime and tax evasion.

Currency in Circulation: Value

( in billions of dollars, as of December 31 of each year )

<table>
<thead>
<tr>
<th>Year</th>
<th>$1</th>
<th>$2</th>
<th>$5</th>
<th>$10</th>
<th>$20</th>
<th>$50</th>
<th>$100</th>
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<td>$13.7</td>
<td>$19.0</td>
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<td>$12.7</td>
<td>$18.5</td>
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<td>$924.7</td>
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<td>$12.2</td>
<td>$17.7</td>
<td>$140.9</td>
<td>$72.5</td>
<td>$663.1</td>
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<td>2011</td>
<td>$10.0</td>
<td>$1.9</td>
<td>$11.8</td>
<td>$17.2</td>
<td>$141.1</td>
<td>$69.6</td>
<td>$782.6</td>
<td>$0.3</td>
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<td>2010</td>
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<td>$1.8</td>
<td>$11.5</td>
<td>$16.6</td>
<td>$130.6</td>
<td>$65.9</td>
<td>$704.6</td>
<td>$0.3</td>
<td>$942.0</td>
</tr>
</tbody>
</table>

78.4% in $100 bills

* [https://www.federalreserve.gov/paymentsystems/coin_currcircvalue.htm](https://www.federalreserve.gov/paymentsystems/coin_currcircvalue.htm)
Cryptocurrencies:

Issues with cash – crime and tax evasion.

- November 8, 2016 India scraps 85% of its currency (1000 and 500 rupee notes)
- Not the first time they have done this (1946, 1978)

http://www.wsj.com/articles/indias-demonetization-debacle-1481851086
Cryptocurrencies:

Issues with cash – crime and tax evasion.

- December 15, 2016
  Venezuela scraps 100 bolivar bill

http://www.wsj.com/articles/venezuelans-protest-over-worthless-cash-1481935897
Cryptocurrencies:

• Calls for digitizing $100 and $50 bills – but do you prevent perfect counterfeiting?
• Answer: Use a blockchain
Cryptocurrencies:
A lack of security plagues cryptocurrencies

- **Mt. Gox**
  - On February 24, 2014, the site shut down with 850,000 bitcoins “missing”
  - Bitstamp closes (temporarily) January 4, 2015
Cryptocurrencies:
A lack of security plagues cryptocurrencies

• But Mt. Gox was a third party.
• With any new technology, there will be good companies entering and bad companies entering.
• Bitstamp experience was different
Cryptocurrencies:
A lack of security plagues cryptocurrencies

• Actually, it is the opposite. There is a historically unprecedented amount of security for bitcoin

• The hash rate is not out of control. It is a result of the incentive structure and it makes the bitcoin blockchain more secure.

Dr. Sarah Meiklejohn, UCL
“The hash rate is out of control” (November 11, 2016)
Cryptocurrencies:
A lack of security plagues cryptocurrencies

- Not all cryptocurrencies are the same
- Bitcoin has the strongest blockchain
- Securities determined by hashing power for Proof of Work blockchains
Cryptocurrencies:
Mining is a waste of energy

- People perceived mining as a waste of energy
- Bitcoin mining farms locating in areas with underutilized energy such as Iceland
Cryptocurrencies:
Mining is a waste of energy

- Mining ensures that the blockchain is secure
- It eliminates the possibility of a breach such as Target losing 40 million credit cards.

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Cryptocurrencies:
Cryptocurrencies are too small today to be an important economic force

- Bitcoin is very small

**FINANCIAL TIMES**

*The $10bn birth of the trusted deletion industry*

Izabella Kaminska | Jul 31 17:47 | 6 comments |

Nobody has been more annoyed by Alibaba’s potential upcoming valuation of Snapchat at $10bn than the Bitcoin community, since its own “world changing” technology currently has a market value of no more than $7bn.* [January 23, 2017 update $14.8 billion]
Cryptocurrencies:
Cryptocurrencies are too small today to be an important economic force

- Currently running about $73B annualized transaction volume (on chain) See: https://blockchain.info/charts/estimated-transaction-volume-usd
- US credit card volume running about $2T
- Bitcoin can currently handle 7 transactions per second whereas Visa can handle 50,000
- But what counts is not necessarily the size today .. but the size tomorrow

http://www.statista.com/statistics/279010/total-dollar-volume-of-leading-global-credit-cards/ 2012 volume= $7.4 trillion. Debit card global volume was $9.9 trillion. In 2014, there were 387.3 billion non-cash transactions: 65% cards; 12% direct debits; 17% credit transfers; 6% checks.
See https://www.worldpaymentsreport.com/download
Cryptocurrencies: Cryptocurrencies are currently too volatile to serve as a store of value

• Bitcoin as a transaction method will not be viable until the volatility is decreased. Currently, it fails as a store of value.
Cryptocurrencies: 
Cryptocurrencies are currently too volatile to serve as a store of value

• Holding for one week: 95% confidence interval is
  – Bitcoin: -23.7% to +23.7% [2012-2016]; -15.6% to +15.6% [2015-2016]
  – S&P500 is -4.3% to +4.3% [2012-2016]
• Worst S&P daily return since 1957 is October 19, 1987 at -20.47%
  – Over last 5 years, bitcoin has had 6 days with less than -20.47% return (1 over the past two years)
• Second worst daily return since 1957 is October 15, 2008 at -9.03%
  – Over last 5 years, bitcoin has had 43 days with less than -9.03% return (13 over the past two years) – including January 11, 2017.
• January 4-11, 2017 bitcoin drops -29.7%. [However, January 11 price was $784 compared to December 1, 2016 price of $751]
Cryptocurrencies:
Bitcoin is currently too volatile to serve as a store of value
Cryptocurrencies:
Bitcoin is currently too volatile to serve as a store of value

Cryptocurrencies:
Bitcoin is just another currency

Ajay Banga, CEO Mastercard
• “The world is not short of currencies, so what is this currency solving for?” February 17, 2014
Cryptocurrencies: Cryptocurrency vs. blockchain

• Perhaps the biggest misunderstanding is between bitcoin, Bitcoin and blockchain
• While most don’t understand bitcoin as a currency, only a very small group understand the potential of the blockchain – and it goes well beyond currency
Cryptocurrencies:
Cryptocurrency vs. blockchain

• The blockchain allows for exchange and verification of ownership as well as conditional contracts
• Bitcoin is in an embryonic stage of development
• It is no coincidence that many smart VCs are investing blockchain related startups
Cryptocurrencies:
Cryptocurrency vs. blockchain

Check out IBM’s proposal for an internet of things architecture using Bitcoin’s block chain tech

by Stacey Higginbotham  SEP. 9, 2014 - 7:00 AM PDT

6 Comments  

SUMMARY: Combine Bitcoin’s block chain technology, BitTorrent and a secure messaging protocol called telehash and you get a distributed infrastructure that some IBM researchers think would be ideal for the internet of things.
Cryptocurrencies:
Cryptocurrency vs. blockchain

“In tech circles block chain technology — the transaction processing engine behind the Bitcoin crypto-currency — has become the technological equivalent of quinoa. Not everyone is sure of what it is, but everyone is raving about it as an answer to any number of tough problems. The latest is IBM’s research team, who are looking at building out a distribution platform for the internet of things that uses block chain.”
Cryptocurrencies: Education

• Challenges: Nobel Laureate #1

The Conscience of a Liberal
Paul Krugman
DECEMBER 28, 2013, 2:35 PM

Bitcoin Is Evil

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Cryptocurrencies: Education

• Challenges: Nobel Laureate #2

Speaking of mind-bending, economics professor Cam Harvey of Duke University did a presentation this afternoon on the blockchain, which is the foundation of Bitcoin. I have been friends with Cam for many years, but it has been an online friendship. He was the first to do research and analysis of the inverted yield curve, and I’ve learned a great deal from talking and writing with him.

Cam came over when the day session finished, and we began to talk about some aspects of blockchain technology. Harry Markowitz, the Nobel Prize laureate who created Modern Portfolio Theory, walked over; and after a few minutes he began to challenge Cam on the mathematical impossibility of what he thought Cam was talking about. It was fascinating watching these two genius professors talk about math and ideas, and eventually Harry got a handle on the process Cam was describing.

But I will confess a small pleasure at watching one of the greatest mathematical economists of our time wrestle with the concept of the blockchain. I have to tell you it took me a while to get my head around the concept, too, and it took Harry only five minutes.
Cryptocurrencies: Education

- It is important for educators to open the black box and to show students and the general public how blockchains work.
The Ad That Made Western Union Realize They’re Fucked

November 25, 2014 By Bill Walsh — 1 Comment

In a direct comparison ad created by a Reddit user the higher ups at Western Union admitted the ad made them finally understand what Bitcoin is.

“People kept asking us ‘Hey, aren’t you worried? This Bitcoin thing looks like a threat!’ and I’d go watch the news and it’d say Bitcoin is involved with the drug trade and illegal operations and I’d ask, ‘No, I’m not worried, why would I be worried?’” stated Hikmet Ersek, CEO of Western Union at a conference on Monday. “Then I saw this ad and thought ‘Fuck, this Bitcoin thing is a threat!’ That’s when I decided to call my lawyers.

Hikmet’s lawyers was able to get the ad taken off Facebook with a DMCA request in an attempt to stem the tide.

“Hikmet called my office shouting ‘Sue these Bitcoin guys, get rid of them before they destroy my business!’ but it was like dude…” says Brad Goldstein of Grayson Moorhead Attorneys which represent Western Union, “Maybe if you came to us like five years ago we could’ve greased the right palms and put up walls in the right places but the cat is out of the bag and it’s starting to fuck your face.”

This is only weeks after Western Union saw an upswing in the market.

“I don’t care what people say, this cat ain’t fucking my face,” said Mr. Ersek to shareholders on the phone to investors Monday night, “We’re going to sue the shit out of the Bitcoin CEO and it’s creator Satoshi Nakamoto, who I’ve found is an old man living in California named Dorian! I’m sicking my lawyers on them as we speak!”