Economic Trends and Potential Business Opportunities

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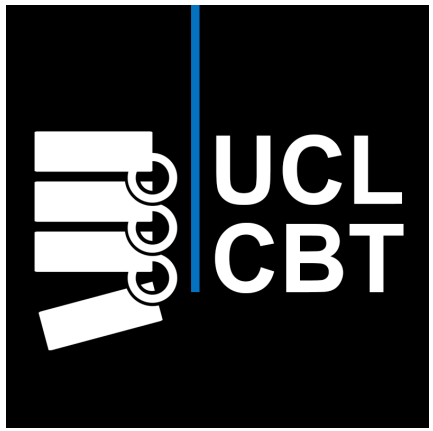
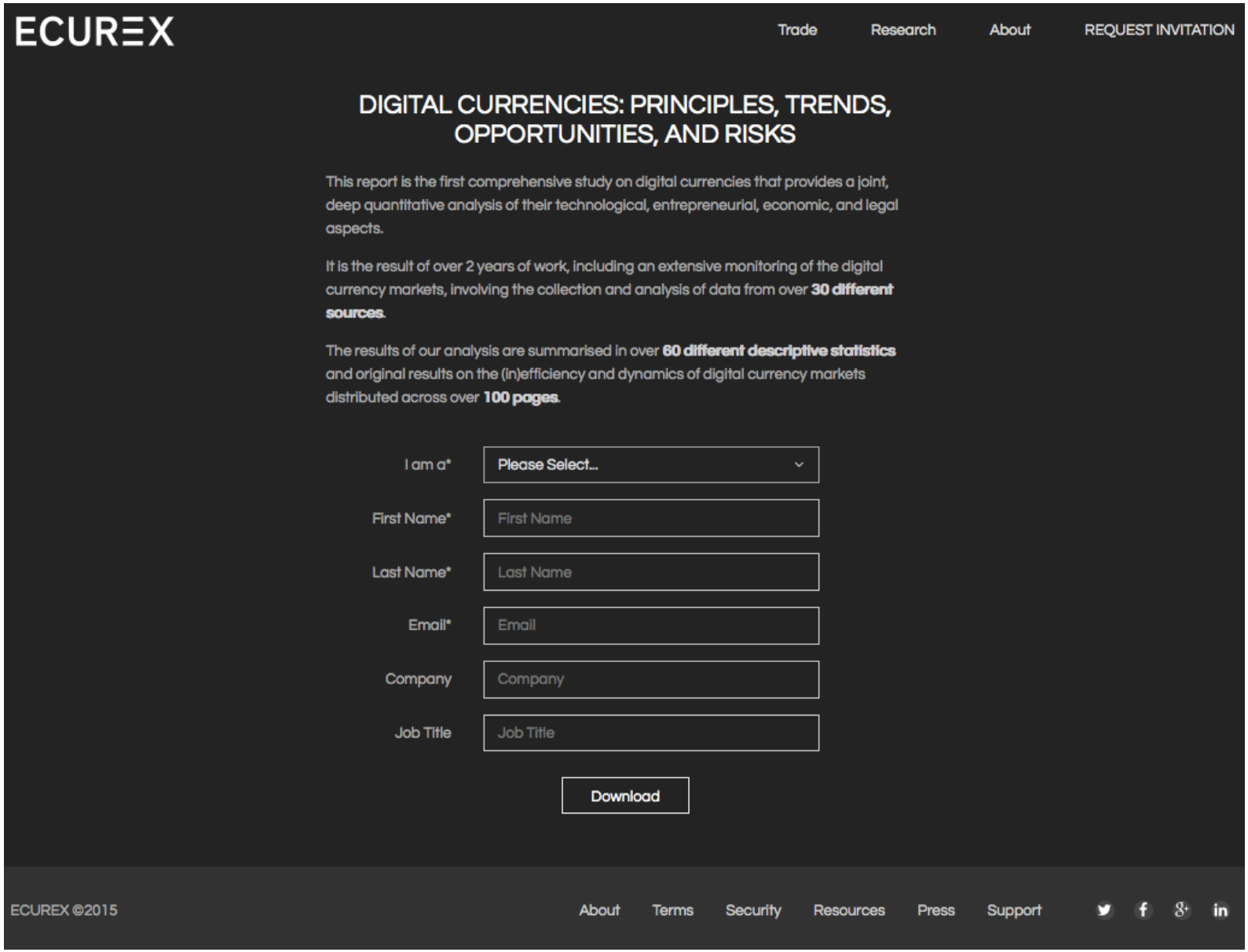


Blockchain: the Next Financial Revolution ? :: Zurich

1. Why Blockchain Technologies are important ?
2. China is the most active country in the world
3. Bitcoin startups raised almost USD 1 billion during the last three years
4. Mining Industry is an Oligopoly
5. The Evolution of the Bitcoin Economy

https://ecurex.com/2015report



Why Blockchain Technologies are important ?

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"It is a shared, trusted public/private ledger that everybody can inspect, but which non single user control."

Why Blockchain Technologies are important ?

"While the Bitcoin hype cycle has gone quiet, Silicon Valley and Wall Street are betting that the underlying technology behind it, the Blockchain, can change...

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Goldman Sachs
(December 2015)

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Goldman Sachs
(December 2015)

Basically...

"What Internet did for information
(Internet of Media and Information Exchange)
Blockchain is doing for money
(Internet of Value Exchange)"

Why Blockchain Technologies are important ?

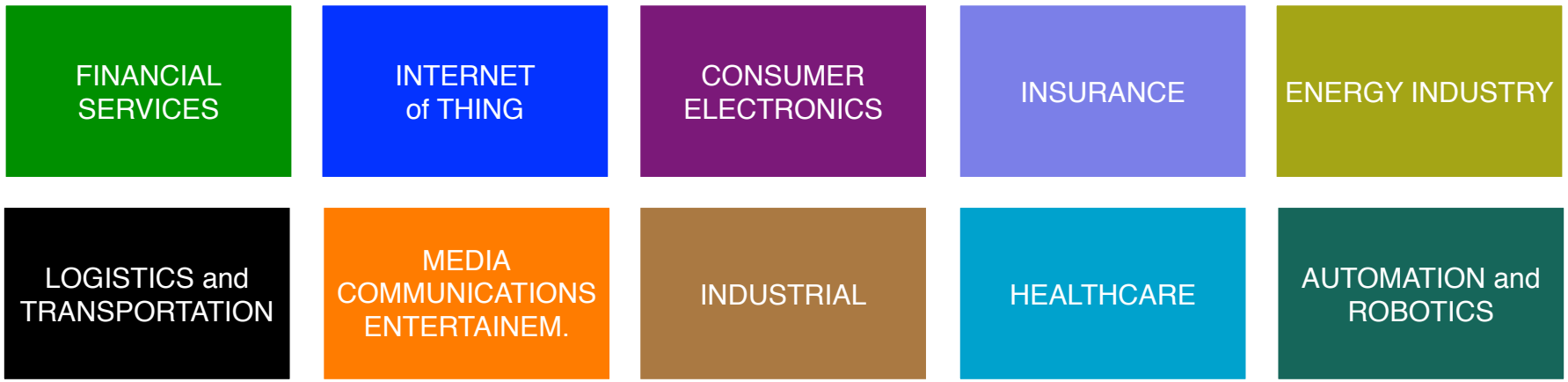

Figure: Sectors that will be affected by the blockchain technology

Why Blockchain Technologies are important ?

Clearing and settlement Post-trading payments and transactions	Governance and monitoring Rating, grading and voting systems.	Brokerage activities	Distributed and, or decentralised immutable data storage
Rewarding and incentive mechanisms	Refereeing, arbitration and notarization	Traceability of products, components and spare parts	Securitization and re-insurance activities
Digitalization of real assets such as stocks, bonds, land titles, and frequent flyer miles	Blockchain IDs for access in apps and websites, and digitally sign documents	Tamper–proof decentralization of controlling and auditing activities	Smart contracts for IoT applications
Correspond banking, trade finance, remittance and payments	Trust & custody Funds holding, and asset management	Shared private blockchain for efficient automatic invoice reconciliation and tracing	Decentralized AI for medical application

Figure: Examples of Blockchain Business Applications

Why Blockchain Technologies are important ?

It is a valid substitute to centralised ledgers in all these cases:

- intermediation;
- clearing and settlement;
- post-trade activities of middle-back offices (i.e., messaging, matching, netting, allocations, payments and reconciliations);
- record system (e.g., guns, precious metals, arts);
- rating or voting system;
- databases;
- distributed storage, authentication, anonymisation of private information;
- rewarding and punishing-incentive schemes;
- transaction traceability schemes;
- refereeing, arbitration;
- notarization (e.g., vehicles registrations).

China is the most active country in the world

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At the end of 2014, Chinese mining pools cover 50% of the total market share

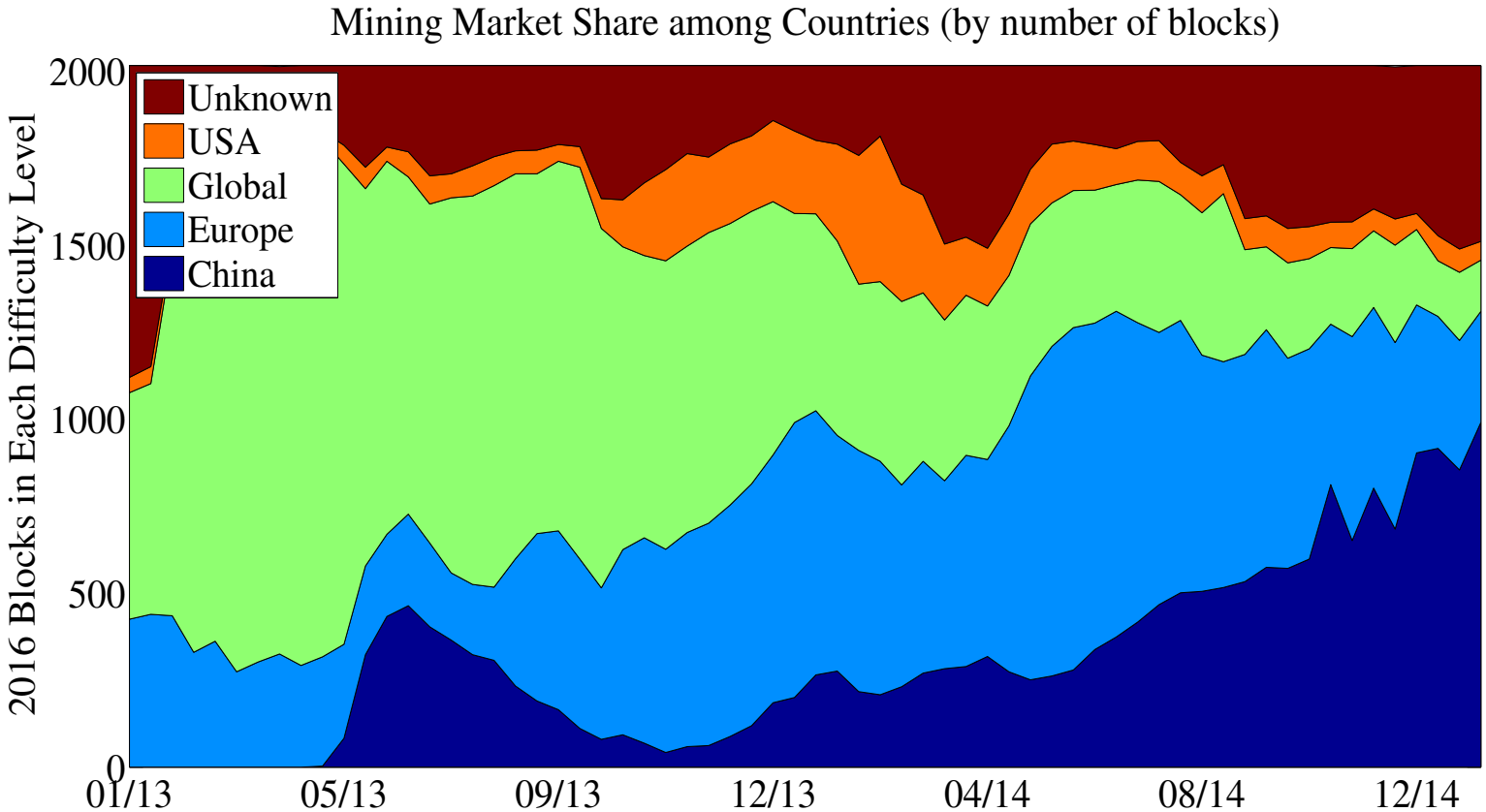
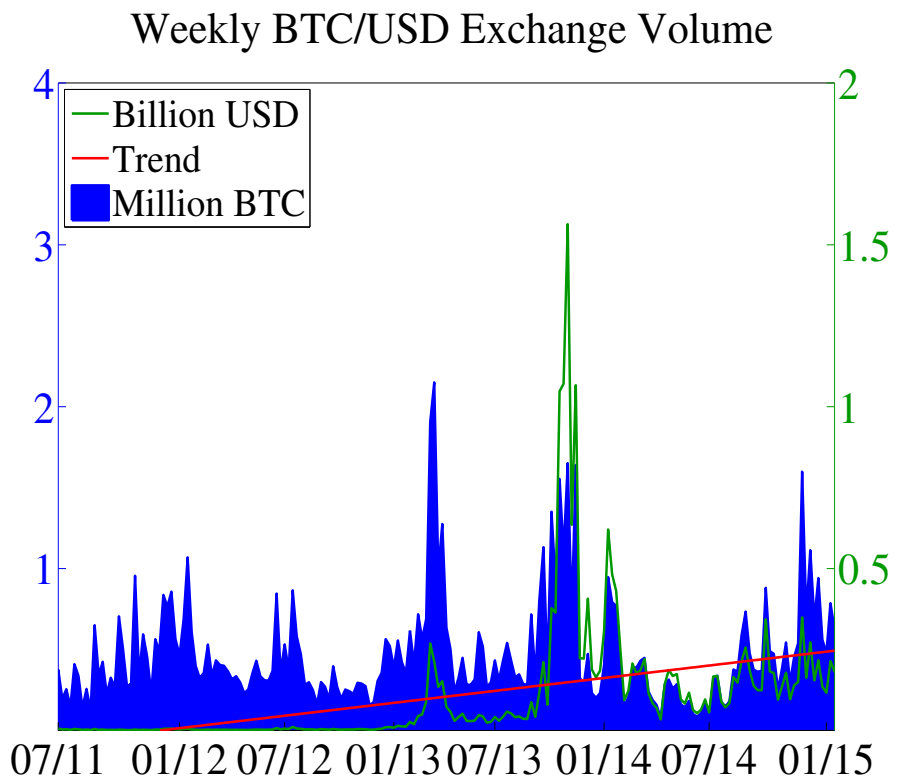


Figure: Top mining activity per country. Mining pools are classified per country of operation. Many mining pools operate in different countries (e.g, BTC Guild and BitMinter run their mining operation in both USA and Europe), so they are classified as "Global". Period: from January 2013 to February 2015. Data source: Blocktrail, Bitcoin Wiki (comparison of mining pools). Internal calculation.

China is the most active country in the world

Since 2014, the traded CNY/BTC volume in is about 3 times larger than the USD/BTC volume, with peaks at BTC 4 million per week



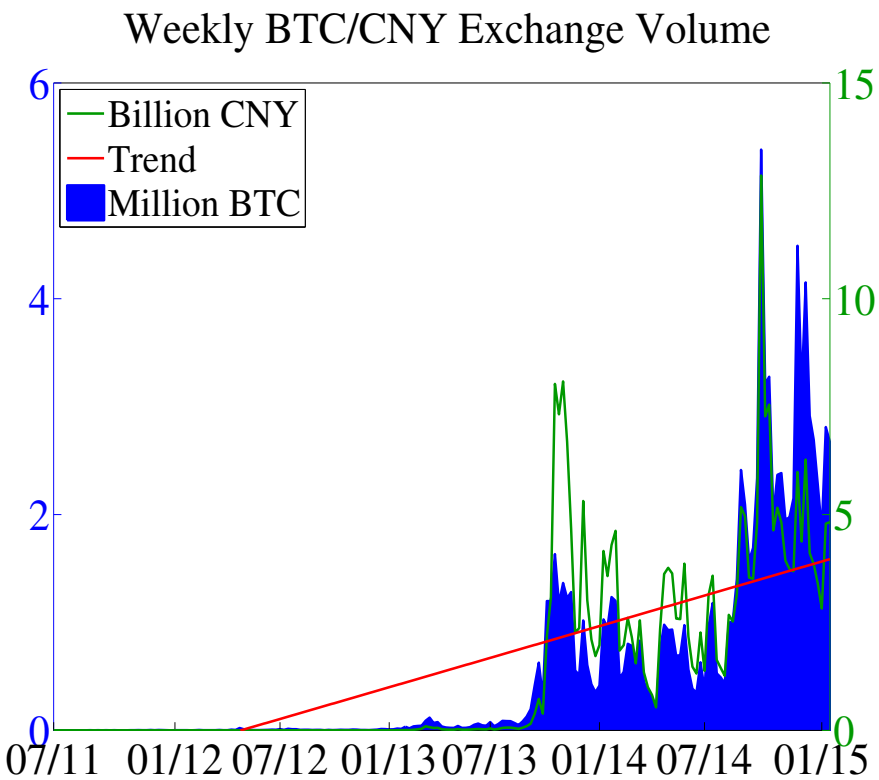


Figure: Weekly exchange volume of Bitcoins in the main trading platforms (Anxbtc, Bitcoin24, btc-e, Bitcoincentral, Bitcoinde, bitfinex, bitmarket, bitstamp, britcoin, btc china, campbx, coinfloor, hitbtc, huobi, kraken, lakebtc, MtGox, okcoin, rmbtb, tradehill) from July 2011 to January 2015. Data source: Bitcoinity. Internal calculation.

China is the most active country in the world

Volume in BTC	Year	BTC/USD	BTC/EUR	BTC/GBP	BTC/CNY
Mean (weekly)	2012	404833 (91.09%)	23320 (5.25%)	11794 (2.65%)	4506 (1.01%)
	2013	650294 (65.91%)	63608 (6.45%)	13225 (1.34%)	259549 (26.31%)
	2014	343025 (**22.33%**)	23059 (1.50%)	7131 (0.46%)	1163197 (**75.71%**)
St. Deviation (weekly)	2012	205498	11401	5230	3796
	2013	460848	54599	8474	438822
	2014	205045	12179	3952	960218
Volume in USD	**Year**	**BTC/USD**	**BTC/EUR**	**BTC/GBP**	**BTC/CNY**
Mean (weekly)	2012	3147387 (89.83%)	220411 (6.29%)	95505 (2.73%)	40219 (1.15%)
	2013	173744312 (52.09%)	13308177 (3.99%)	2537553 (0.76%)	143965181 (43.16%)
	2014	171547907 (**22.33%**)	11750245 (1.64%)	3554263 (0.50%)	530584398 (**73.96%**)
St. Deviation (weekly)	2012	1682033	163329	54862	35771
	2013	322865053	22231294	3792220	332101759
	2014	113491426	7633762	2119485	335344667

Table: Annual mean and volatility of the Bitcoin market volume exchanged in major trading platforms and expressed in BTC and USD. Platforms: Anxbtc, Bitcoin24, btc-e, Bitcoincentral, Bitcoinde, bitfinex, bitmarket, bitstamp, britcoin, btc china, campbx, coinfloor, hitbtc, huobi, kraken, lakebtc, MtGox, okcoin, rmbtb, tradehill.

China is the most active country in the world:

China has the largest number of active Bitcoin clients

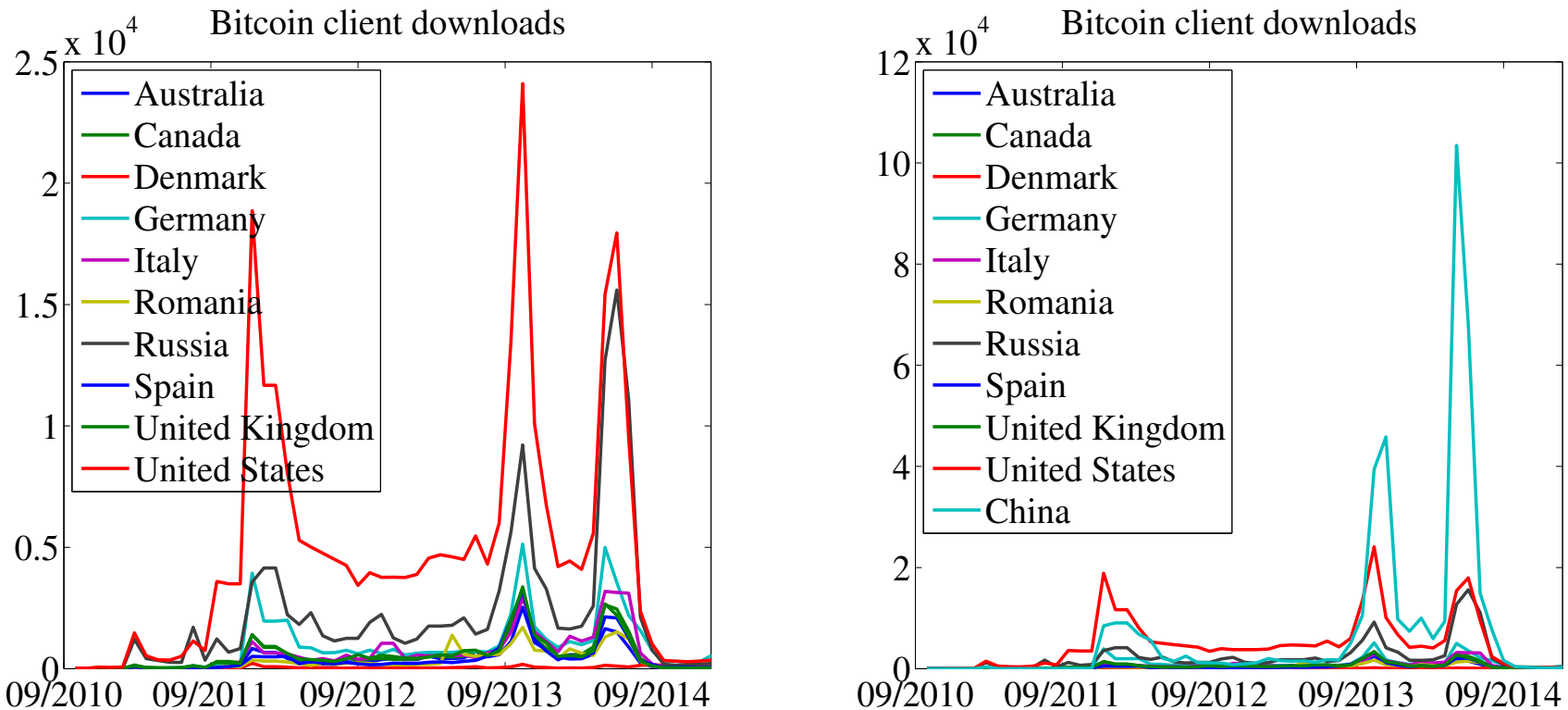


Figure: Bitcoin client downloads per country normalised by the complementary number of users that have direct access to the Internet. Data source: ITU (International Telecommunication Union) and Sourceforge. Internal calculation.

Bitcoin startups raised almost USD 1 billion

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Bitcoin startups raised almost USD 1 billion in three years with an annual investment growth rate of about 150%.

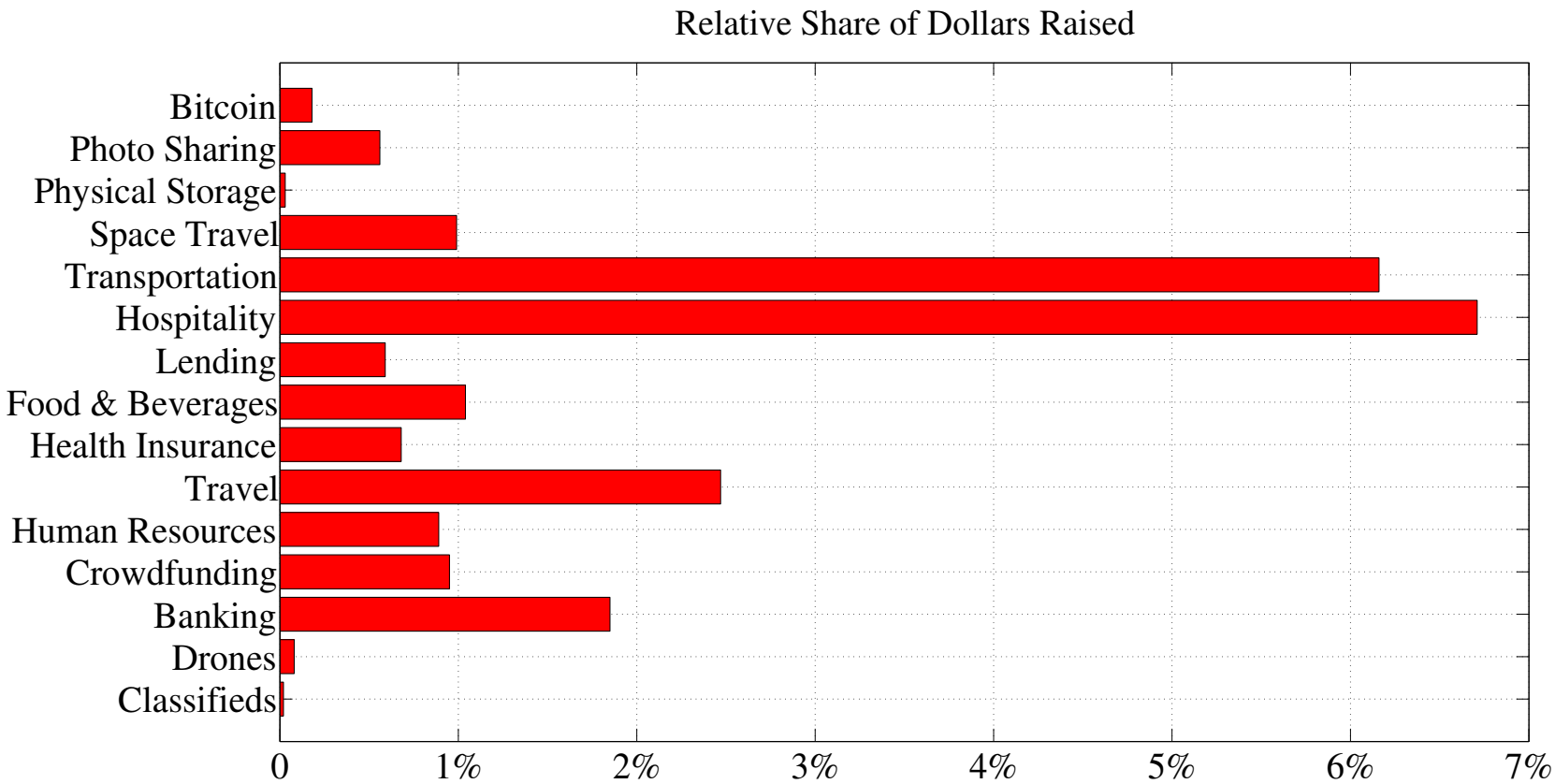

Figure: Relative Capital investment into different startup businesses during the period mid-2012 till mid-2015. Data source: Mattermark. Internal calculation.

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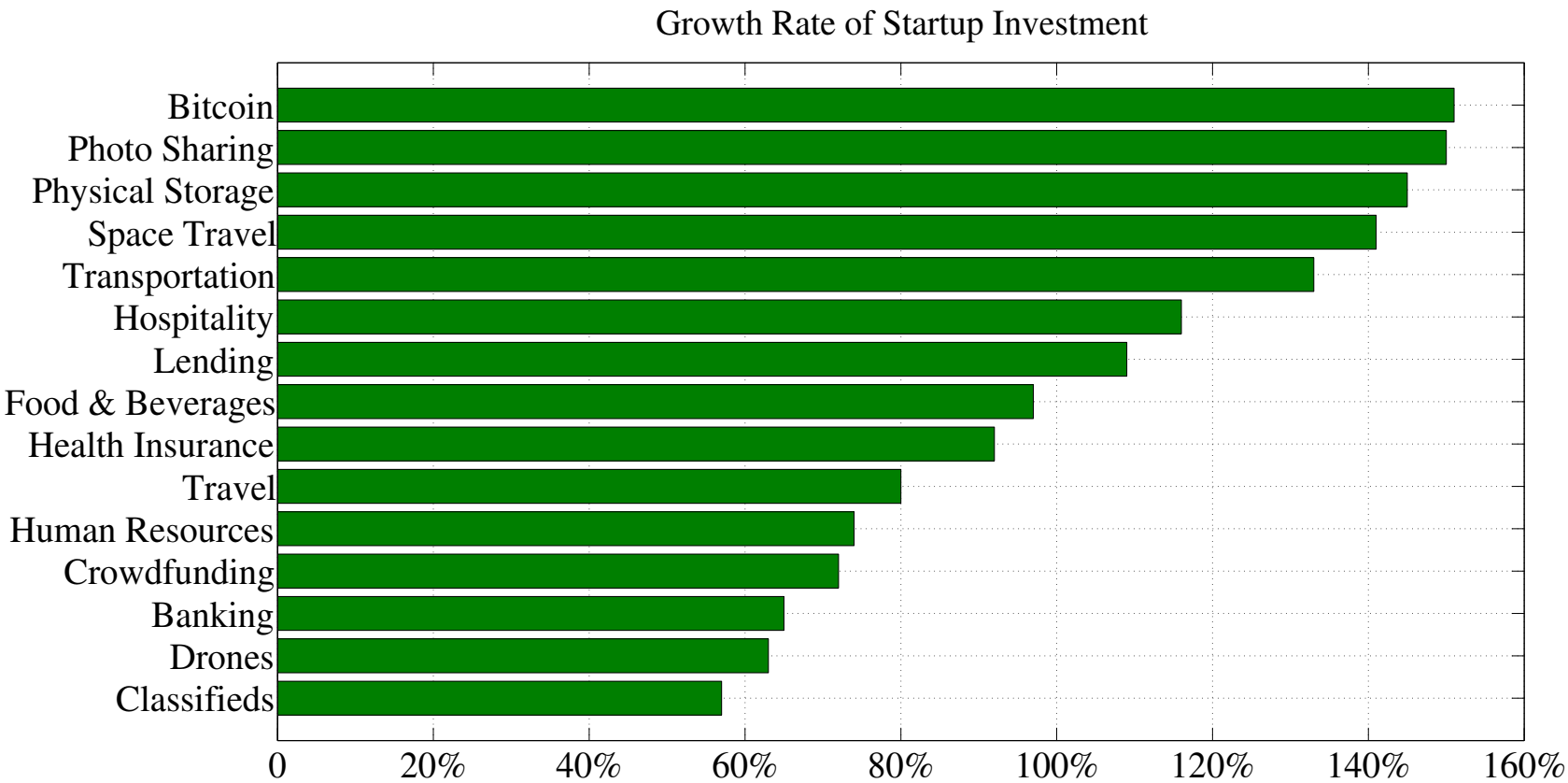

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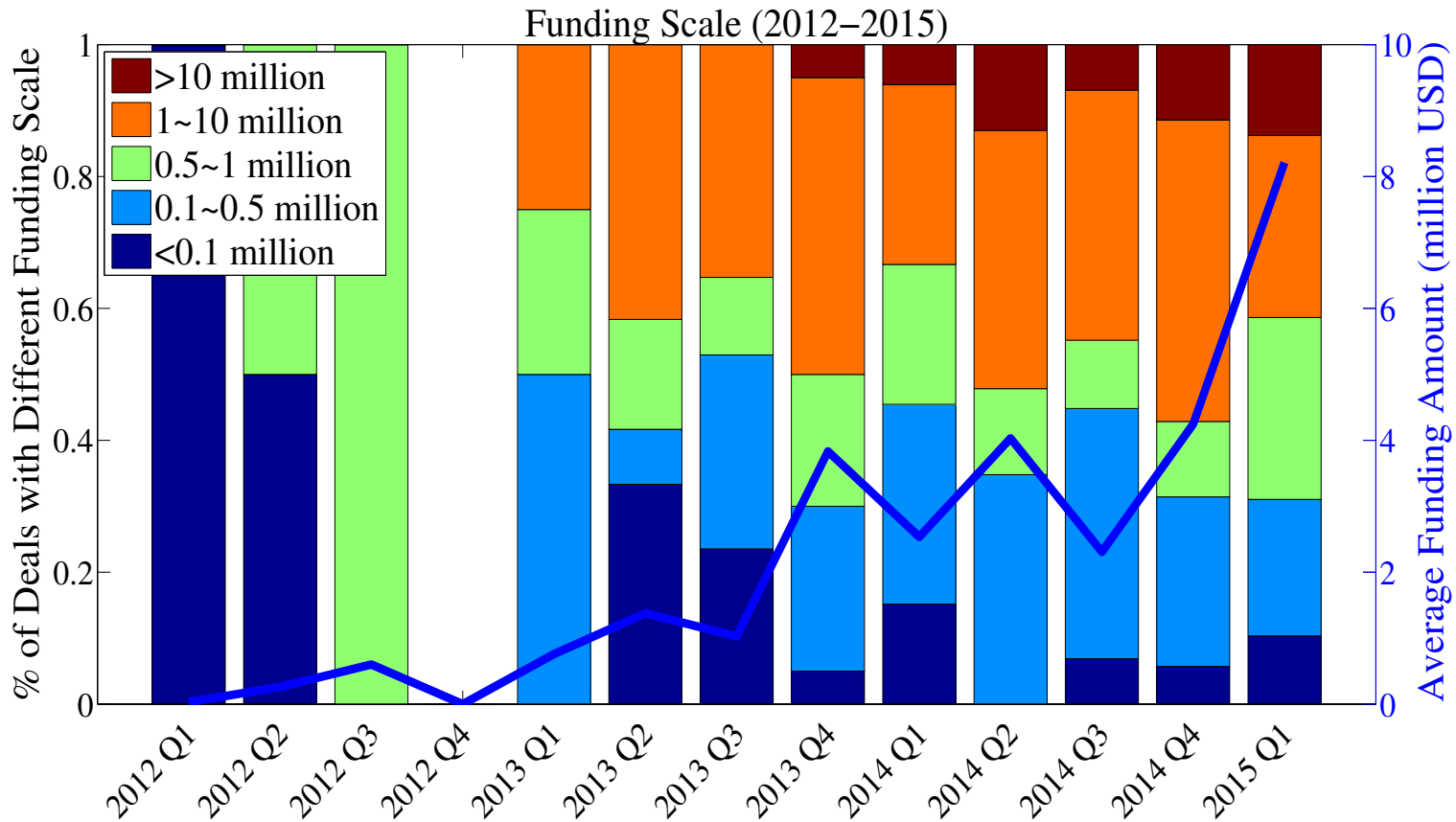

Figure: Bar chart: Percentage of deals in different funding scales, from Q1/2012 to Q1/2015. Line chart: Average funding amount per deal in each quarter. Data source: Bitangel, Cbinsight, Coinfilter, Coindesk, Crunchbase. Internal calculation.

Bitcoin startups raised almost USD 1 billion

Capital Market	**Payment and Remittance**	**Financial Services**	**Blockchain Application**	**Mining Industry**	**Miscellaneous**
Exchange	Payment	Accounting	Smart Contracts	Mining Solutions	Bitcoin Faucet
Derivatives	Remittance	Security	Blockchain API	Mining Pool	Tipping
Commodity	Wallet	ATM			Messaging
Institutional Trading		Market and			
Crowdfunding and		Data Analysis			
Crypto Equity					

Table: Classification of business categories in the Bitcoin industry.

Bitcoin startups raised almost USD 1 billion

Mining and Capital Market industries drove the funding race

Mining and Payment & Remittance drove the funding race per nr deals

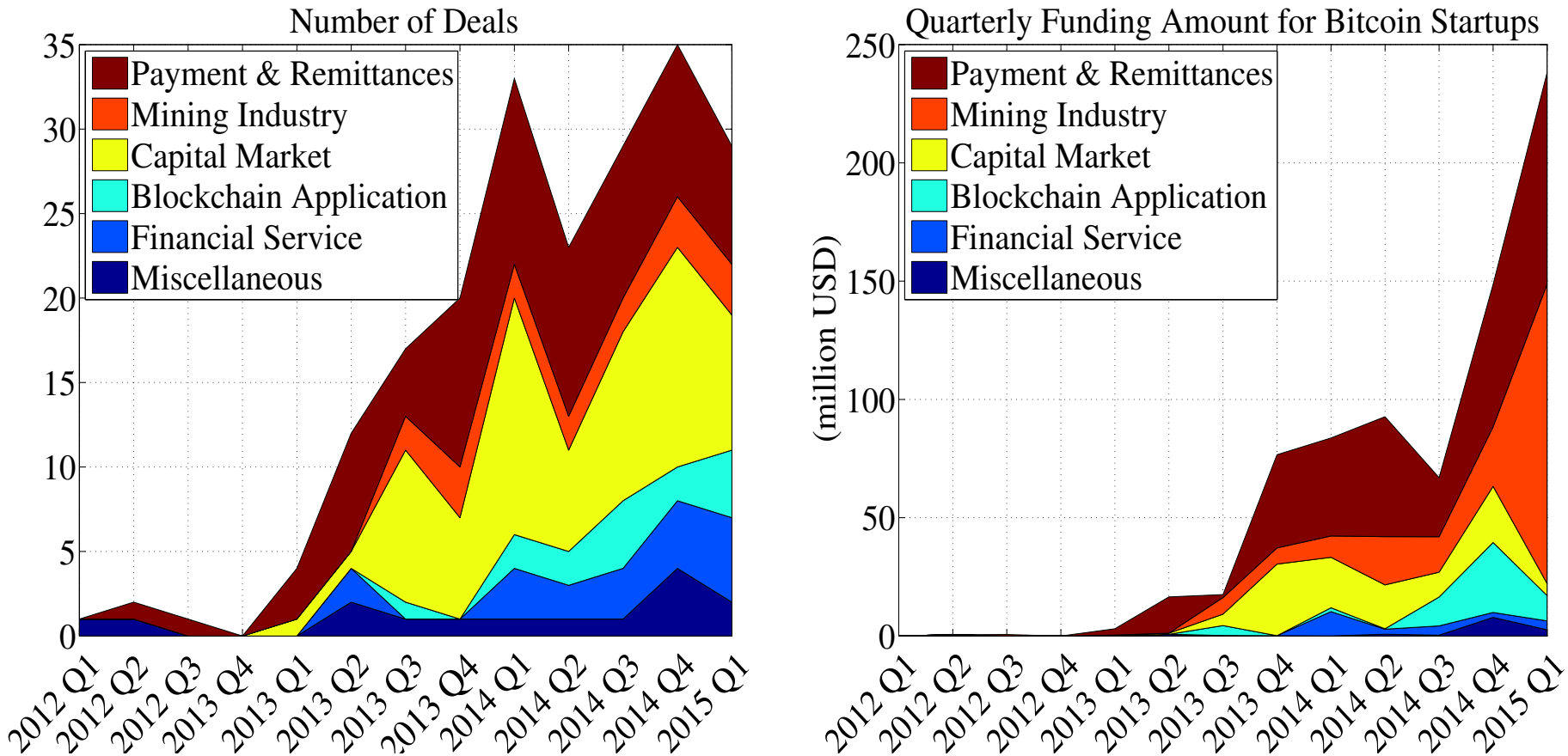

Figure: Left: Quarterly number of deals for startups in different Bitcoin industries. Right: Quarterly funding amount for startups in different Bitcoin industries. Data source: Bitangel, Cbinsight, Coinfilter, Coindesk, Crunchbase. Internal calculation.

Bitcoin startups raised almost USD 1 billion

Payment & Remittance and Mining are capital intensive industries and dominate the top rounds of funding per size (i.e., individual deals with size larger than USD 10 million)

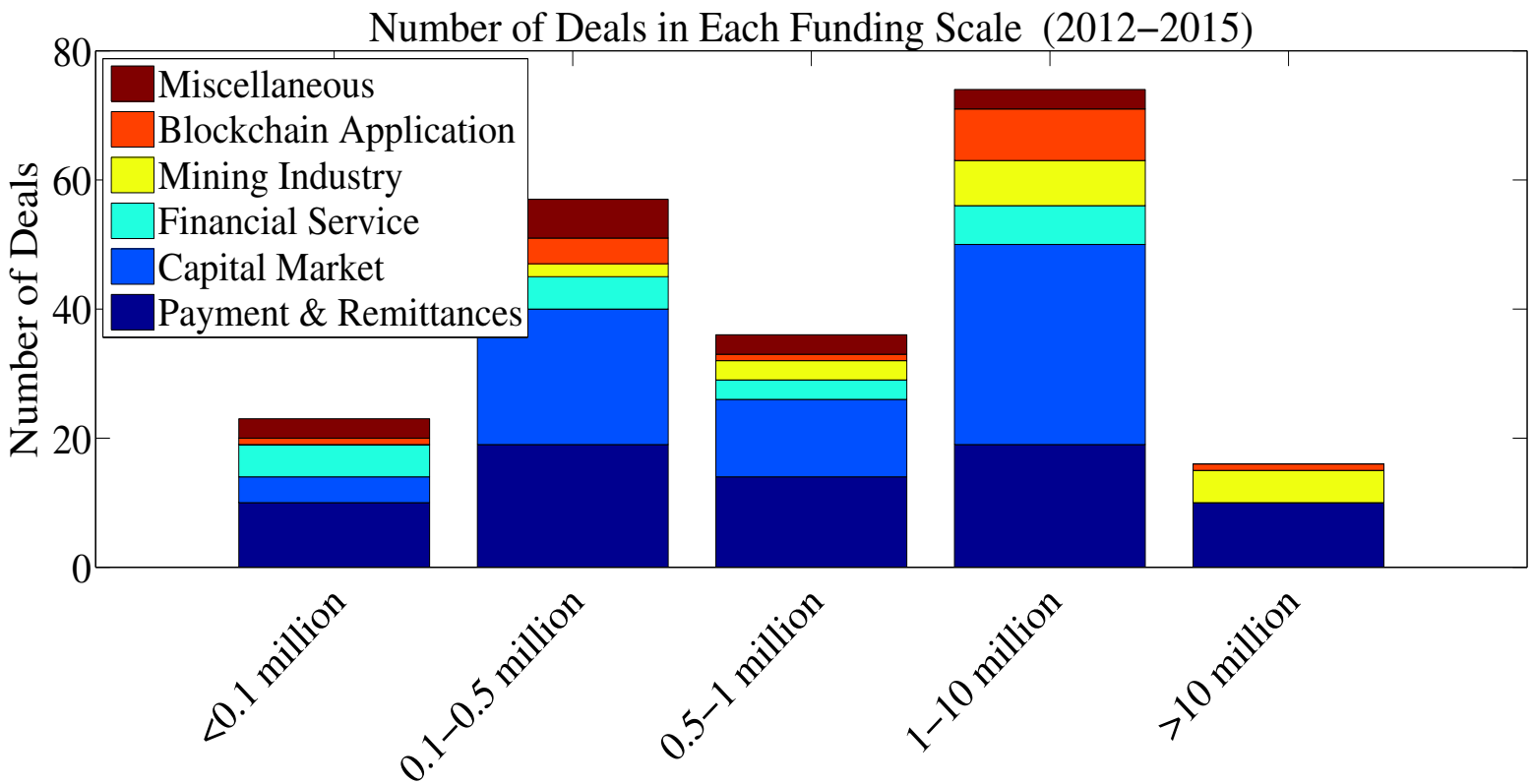

Figure: Number of deals in each funding scale (Q1/2012 to Q1/2015). Deals in each funding scale are further divided into business categories. Data source: Bitangel, Cbinsight, Coinfilter, Coindesk, Crunchbase. Internal calculation.

Bitcoin startups raised almost USD 1 billion

Coinbase covers 1/3 of the capital raised by the whole P&R industry

21 Inc covers 1/2 of the capital raised by the Mining industry

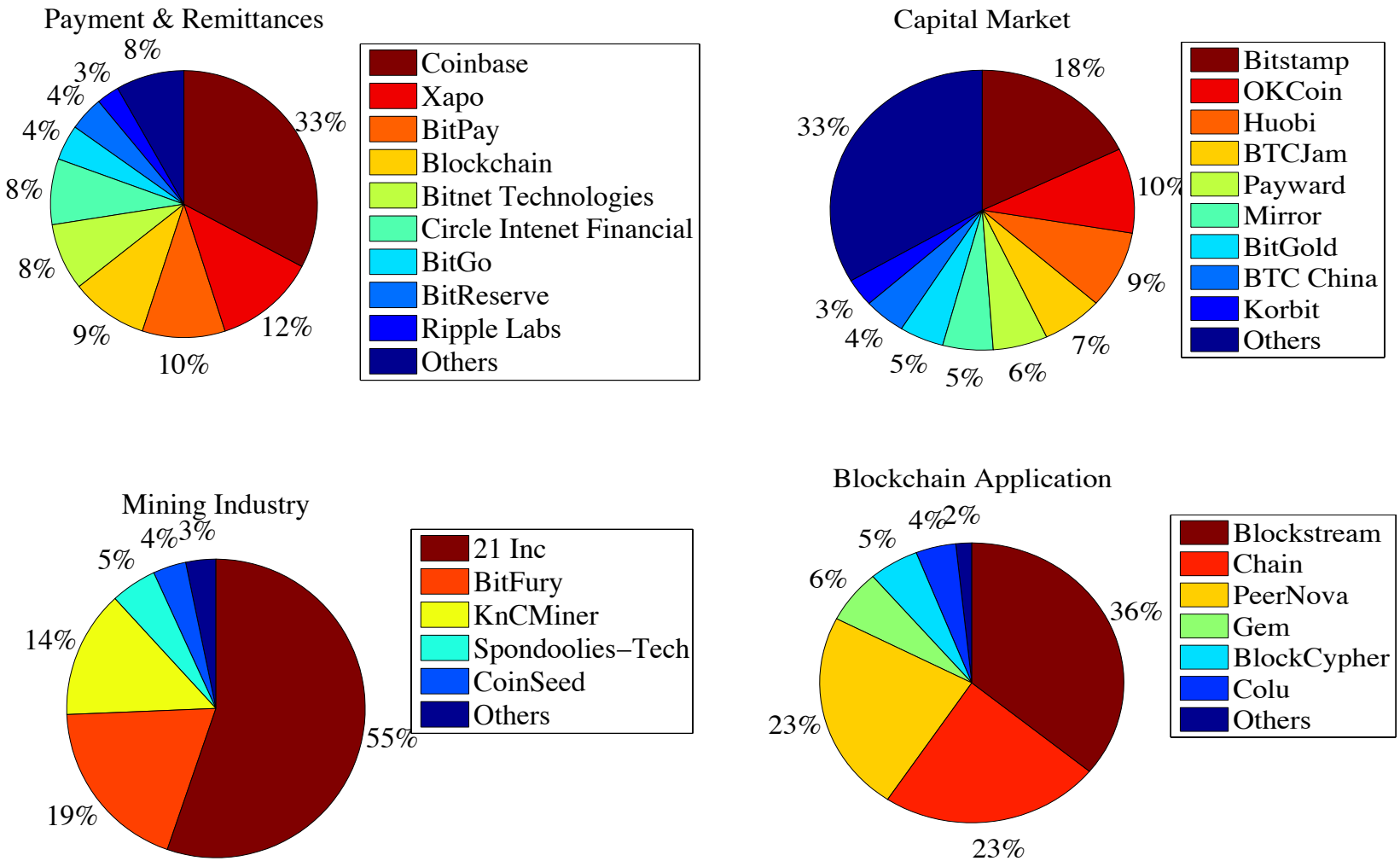

Figure: Funding distribution among startups within main categories (Q1/2012 – Q1/2015).

Bitcoin startups raised almost USD 1 billion

Mining Industry and Blockchain Application are the two industries with the largest average amount of funding raised per individual deal

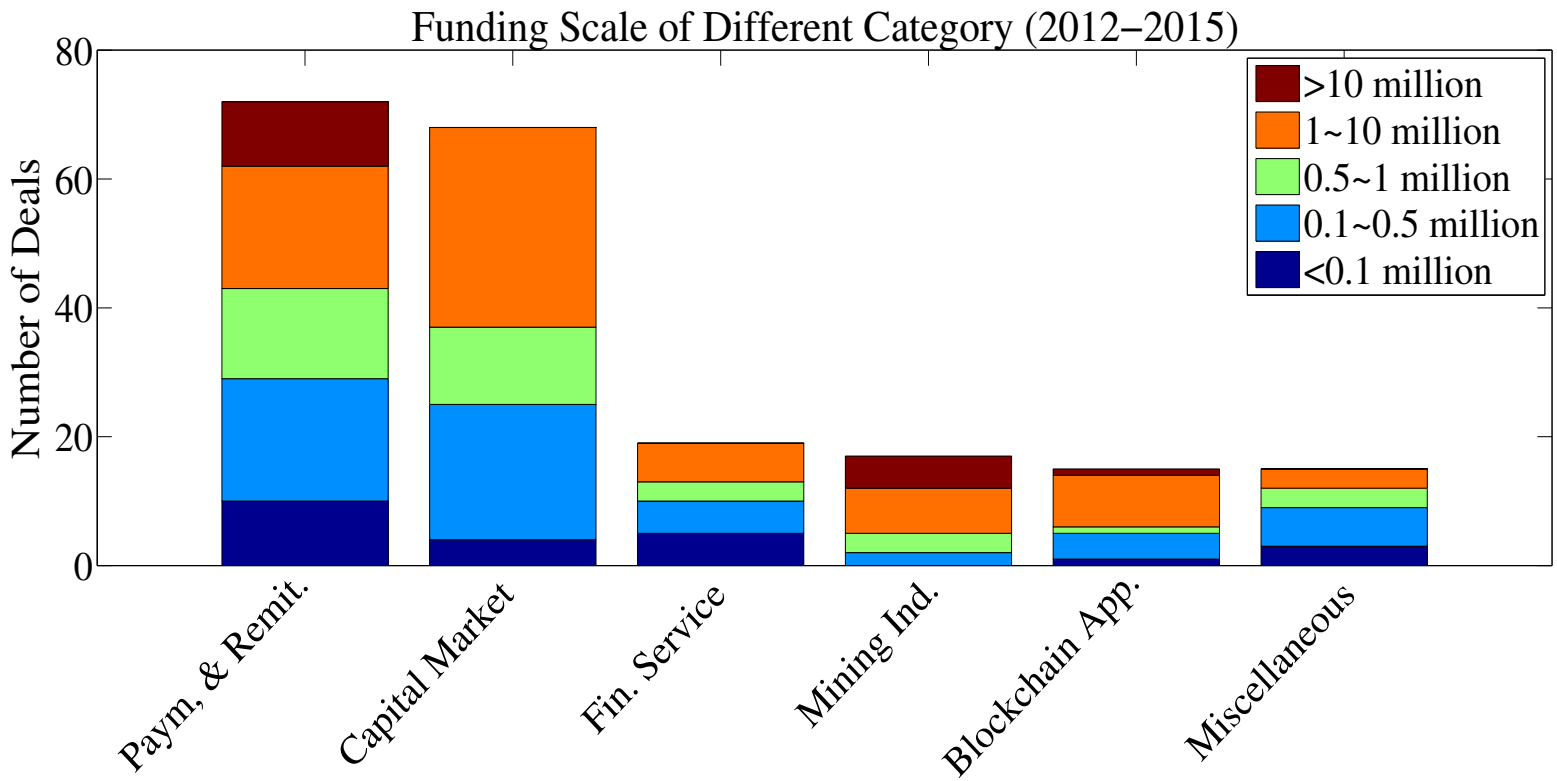

Figure: Total investment deals in different category, divided by funding scales, from Q1/2012 to Q1/2015. Data source: Bitangel, Cbinsight, Coinfilter, Coindesk, Crunchbase. Internal calculation.

Mining Industry is an Oligopoly

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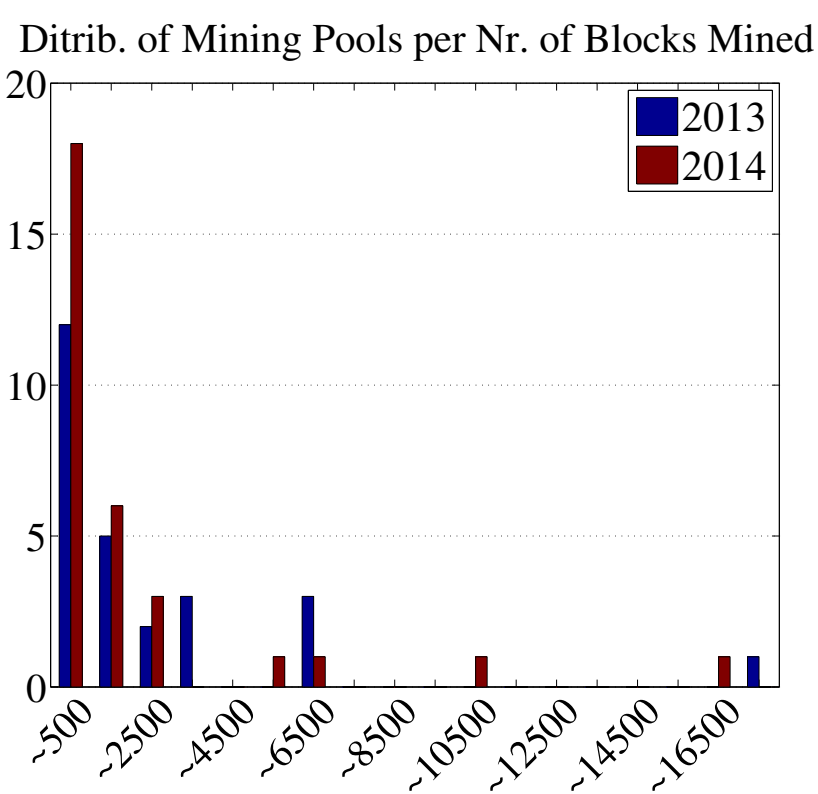
The cumulative market share of the largest 10 pools relative to the total market hover in the 70%-80% range



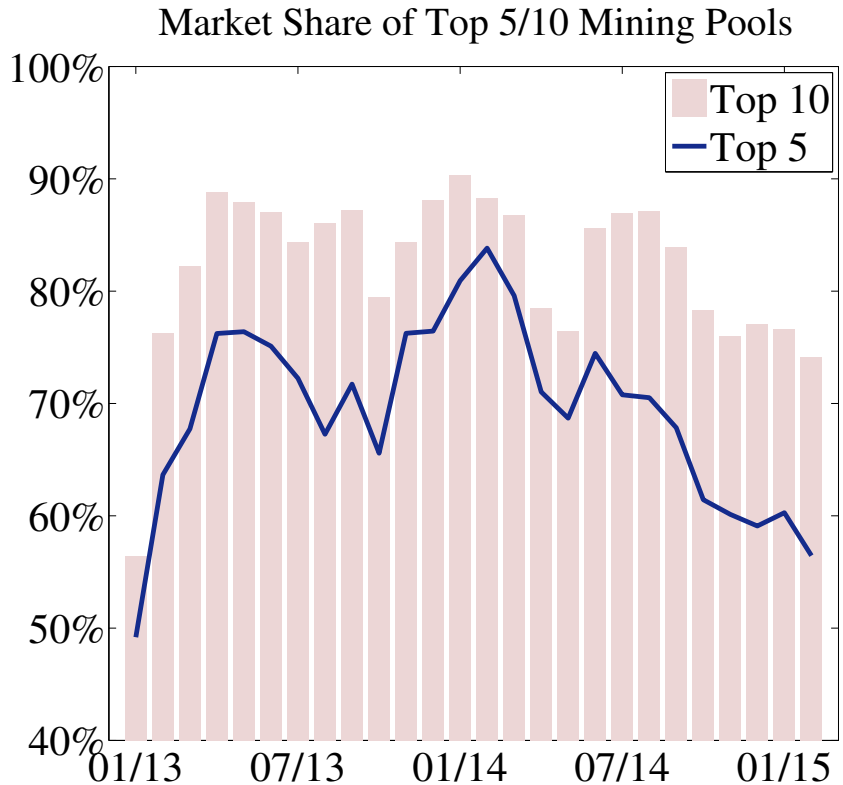


Figure: Left: Distribution of mining pools per number of blocks. Right: Market share of top 5 and 10 mining pools. Data source: Blocktrail. Internal calculation.

Mining Industry is an Oligopoly

- Ghash.IO hashing power was close to "51% attack" for several times.

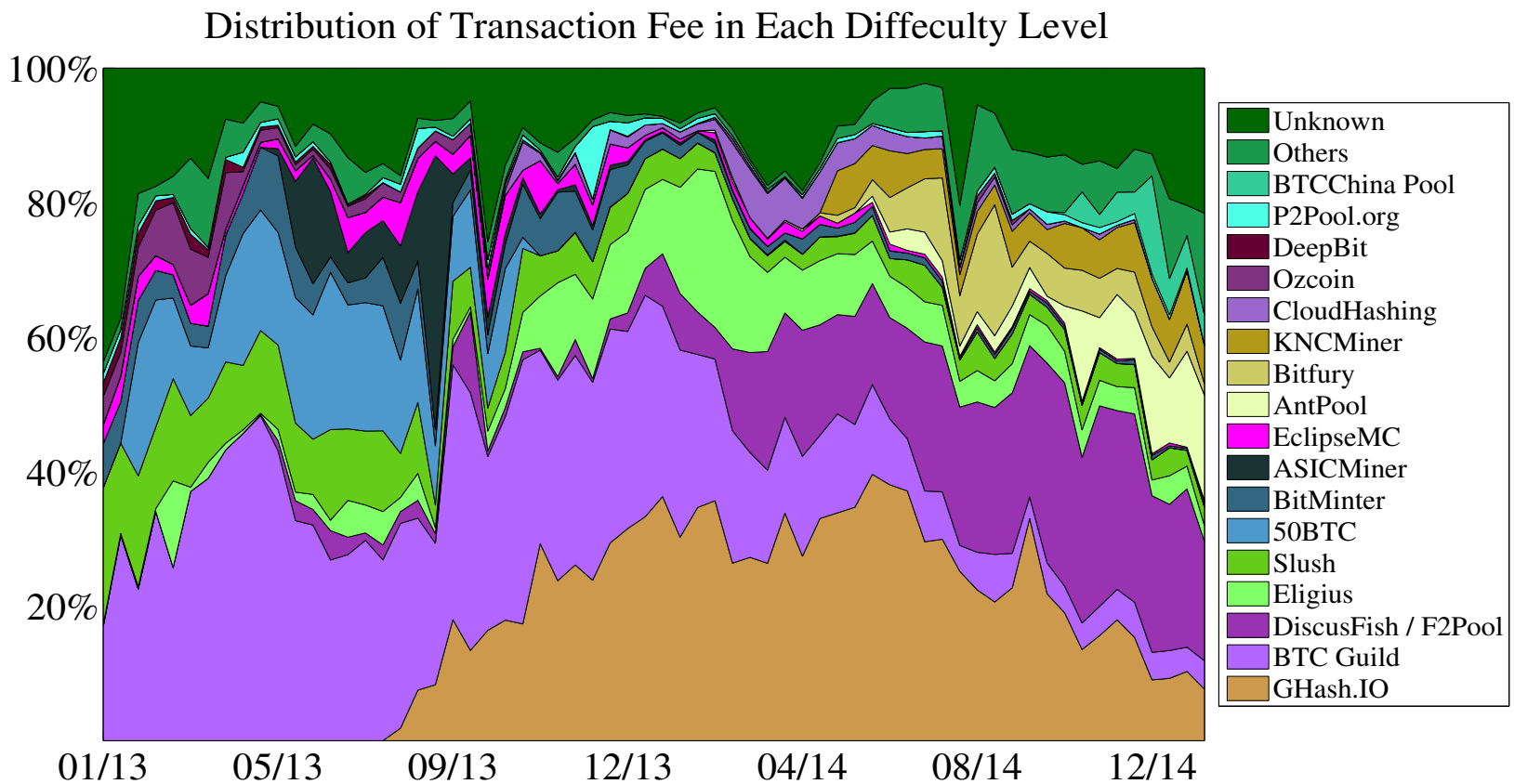


Figure: Top 17 mining pools (out of 40) per relative amount of fees earned. In each difficulty level, transaction fees collected by each mining pool are summed up and compared to the total fees earned and collected by the market. Period: From January 2013 to February 2015. Data source: Blocktrail. Internal calculation.

The Evolution of the Bitcoin Economy

The Evolution of the Bitcoin Economy

Three Marked Regimes

Three market regimes have evolved as the Bitcoin economy has grown and matured

- early prototype stage;
- growth stage populated in large part with "sin" enterprise (i.e. gambling, black markets)
- phase marked by a sharp progression away from "sin" and toward legitimate enterprises.

The Evolution of the Bitcoin Economy

Nakamoto (2008) indirectly recognize the power of the input address method by saying that

"*Some linking is still unavoidable with multi-input transactions, which necessarily reveal that their inputs were owned by the same owner. The risk is that if the owner of a key is revealed, linking could reveal other transactions that belonged to the same owner*"

The Evolution of the Bitcoin Economy

There are two general procedures that have been proposed thus far to solve the problem of de-anonymizing Bitcoin addresses: "clustering" and "labeling"

- Clustering consists of grouping together in one unique cluster all the addresses that belong to the same entity (i.e. legal or individual person). This approach requires one to apply either the "input address heuristic" and/or the "change address heuristic".
- Labeling consists of either:
  - manually tagging Bitcoin addresses to specific entities by directly participating in Bitcoin transactions with those entities;
  - scraping specific web pages in which, for any reason, the identity of Bitcoin addresses holders is public and can be extracted.

The Evolution of the Bitcoin Economy

Input address heuristic

If address x and address y are both inputs of a transaction, then we assume address x and y belong to the same economic entity. Furthermore, if both address y and address z belong to another transaction, we would extrapolate that address x, y and z are all belonging to the same economic entity.

Subject to False Negative but not to False Positive !

The Evolution of the Bitcoin Economy

- From 3 of Jan 2009 (Genesis Block) to the 7 of May 2015 (Block 355403), we extract around 75 million valid addresses. Followed method suggested by Satoshi Nakamoto, we end up with 10 million clusters which have at least 2 addresses.
- In order to apply our methedologhy on large business groups, we select 2,850 large cluster:[a]
  - include at least 100 addresses
  - received at least BTC 1,000 totally in the past

[a] All the selected clustered generated a total revenue (inflow) over the period 2009–2015 of BTC 69,488,575 equivalent to USD 30 billion.

The Evolution of the Bitcoin Economy

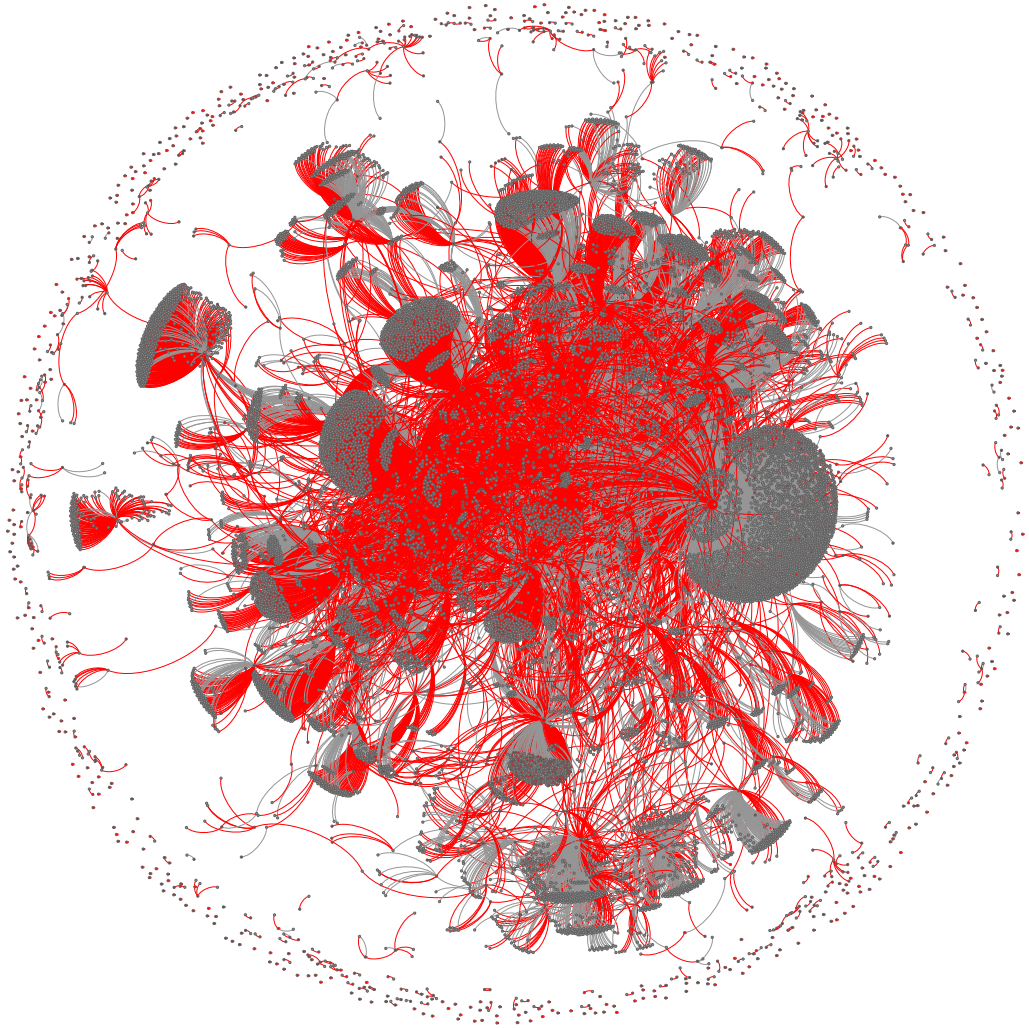
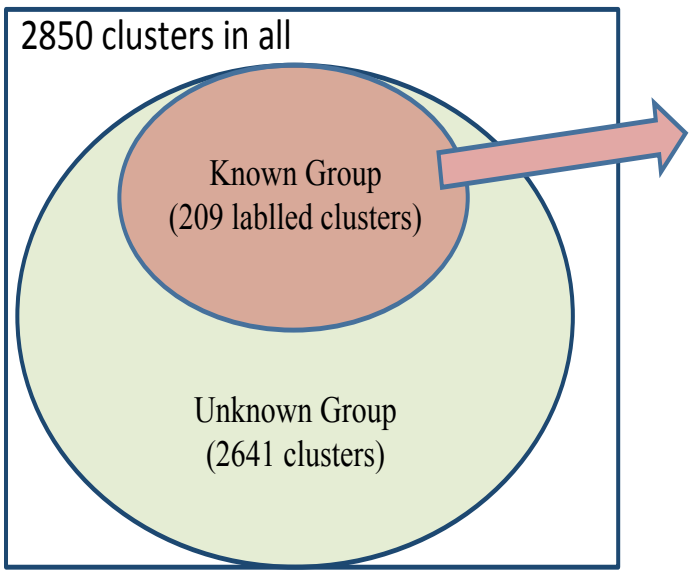


Figure: Network visualisation of the interactions of the economic entities with each others and with all the remaining clusters. Every red node represents a single economic entity and every grey node represents a counterpart clusters. For visualization purposes, we set a threshold of at least 1,000 BTC being transferred between an economic entity and its counterpart. Therefore, the plot shows only 1,957 economic entities out of 2,850.

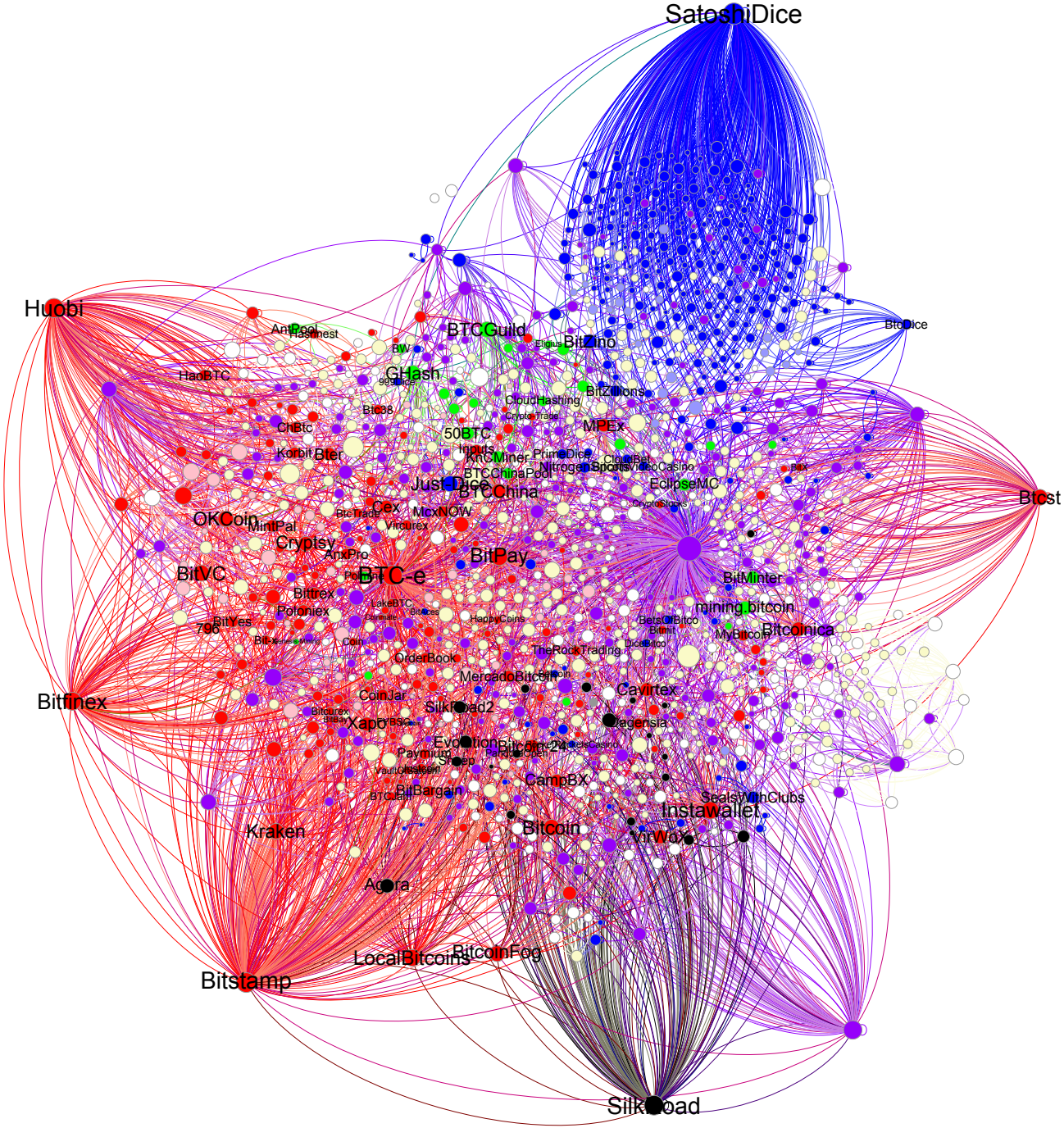
The Evolution of the Bitcoin Economy

Linking sample clusters to real entity

- We collect tagged addresses from some public website
- We label cluster with real entity name (known group), if it has at least one tagged address linked to business name.



Category	# of clusters
Exchange	104
Miner	18
Online Gambling	45
Black Market	13
Others	29
Total	209



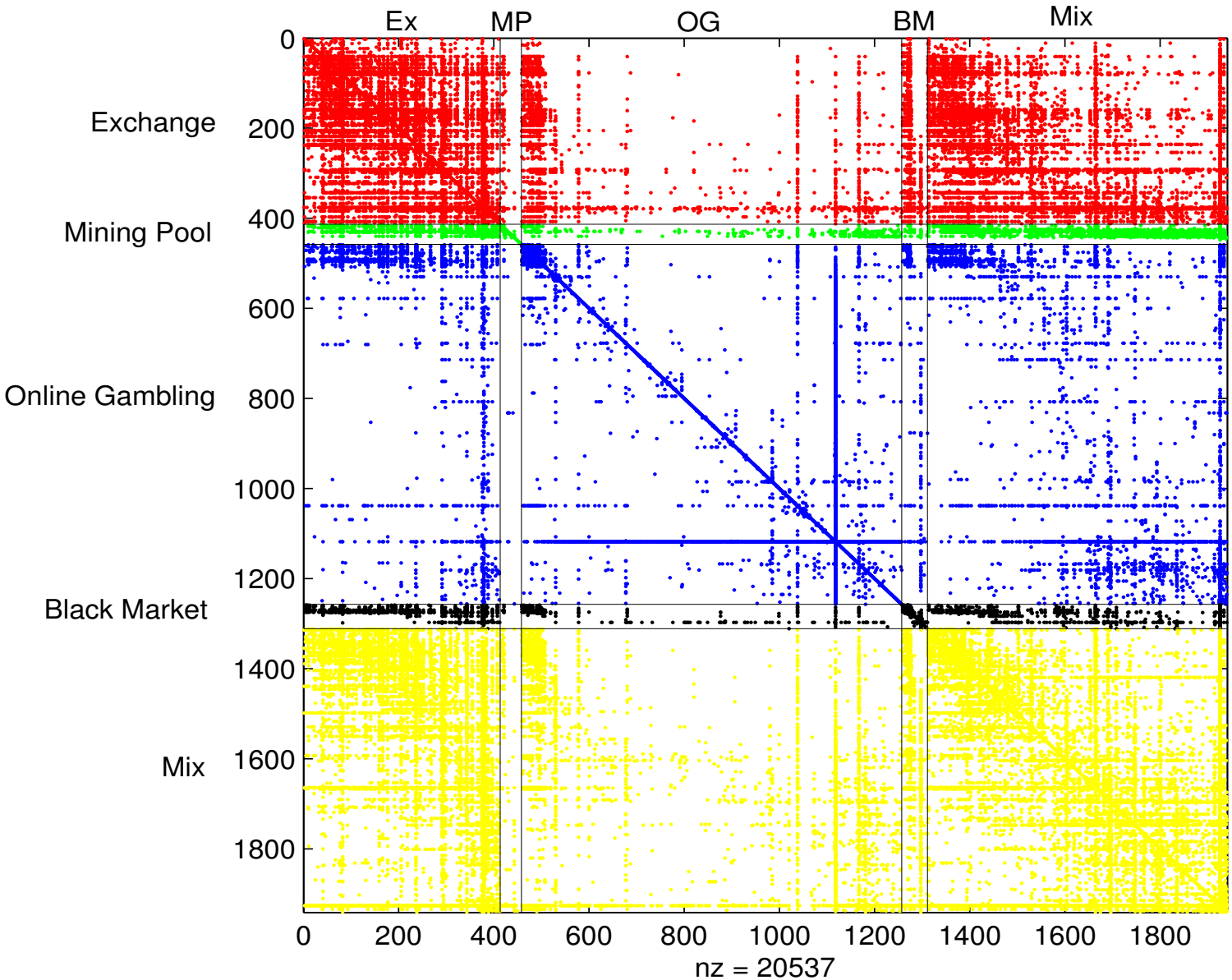
Node Size and color

Inflow Volume

87887761 btc
1000 btc

Category

- Exchange
- Mineing Pool
- Online Gambling
- Black Market
- Mix
- Others
- Trader
- Gambler
- Black Market User
- Individual or Unknown Entity


Ex
MP
OG
BM
Mix
Exchange
Mining Pool
Online Gambling
Black Market
Mix
0
200
400
600
800
1000
1200
1400
1600
1800
nz = 20537

The Evolution of the Bitcoin Economy

Relative % of BTC Received

→	Ex	MP	OG	BM	Mix
Ex	**77.3**	3	0.5	20.3	5.1
MP	1.3	**82.9**	0.1	0.1	0.6
OG	0.4	2.4	**95.2**	0.8	1.1
BM	2.3	0.9	0.1	**32.6**	0.9
Mix	18.7	10.8	4.1	46.2	**92.2**
	100	100	100	100	100

Relative % of BTC Sent

→	Ex	MP	OG	BM	Mix	100
Ex	**78.4**	0	0.6	2.3	18.6	100
MP	27.6	**20.3**	2.5	0.1	49.5	100
OG	0.3	0	**96.5**	0.1	3.1	100
BM	24.7	0.1	2	**38.9**	34.3	100
Mix	5.2	0	1.5	1.4	**91.8**	100

The Evolution of the Bitcoin Economy

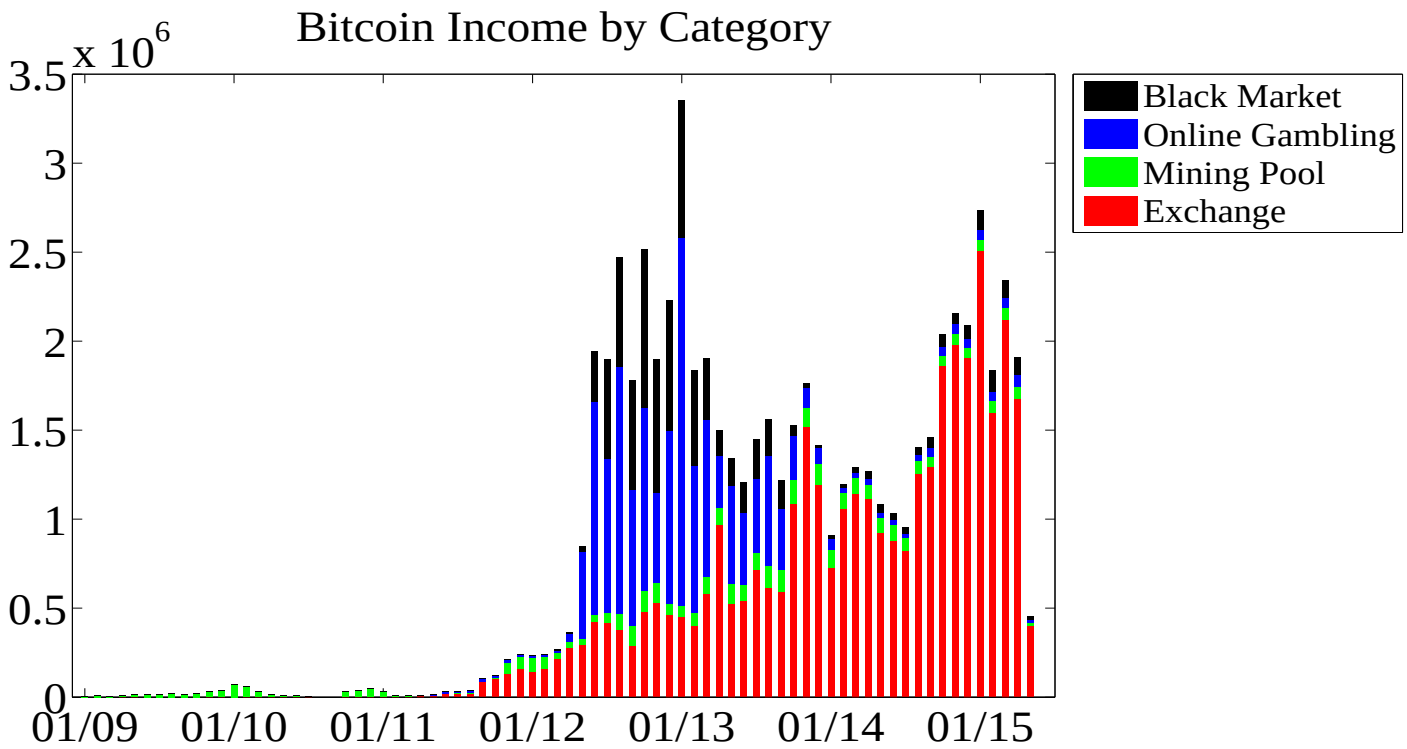


Figure: Stacked plot of the inflow income for each business category in our sample over the Bitcoin network of inflows, monthly from January 2009 through May 2015.

The Evolution of the Bitcoin Economy

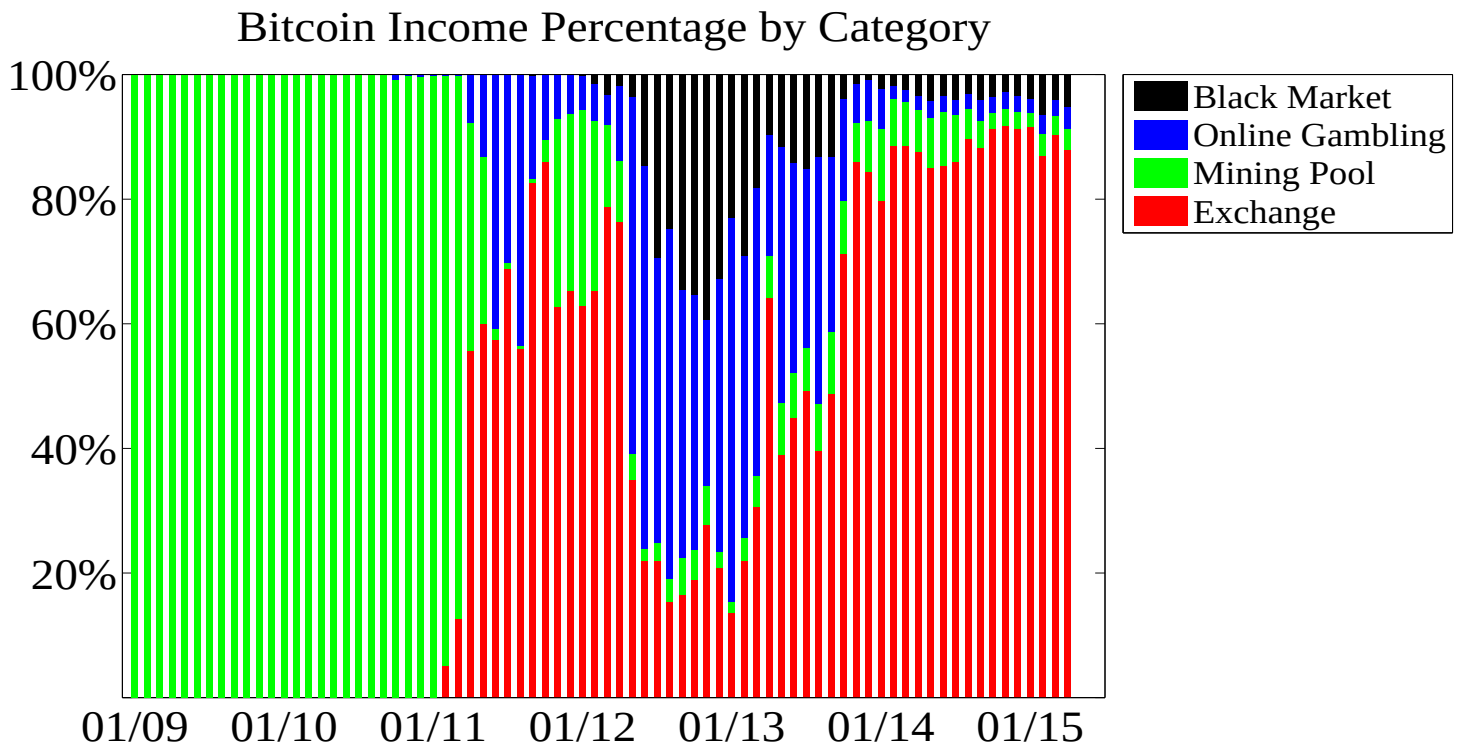


Figure: Stacked plot of the relative income for each business categories as a percentage of total income inflows, monthly from January 2009 through May 2015. Mining dominates initially, then Sin categories (gambling in blue and black markets in black)rise, but recede over time in favor of exchanges.

The Evolution of the Bitcoin Economy

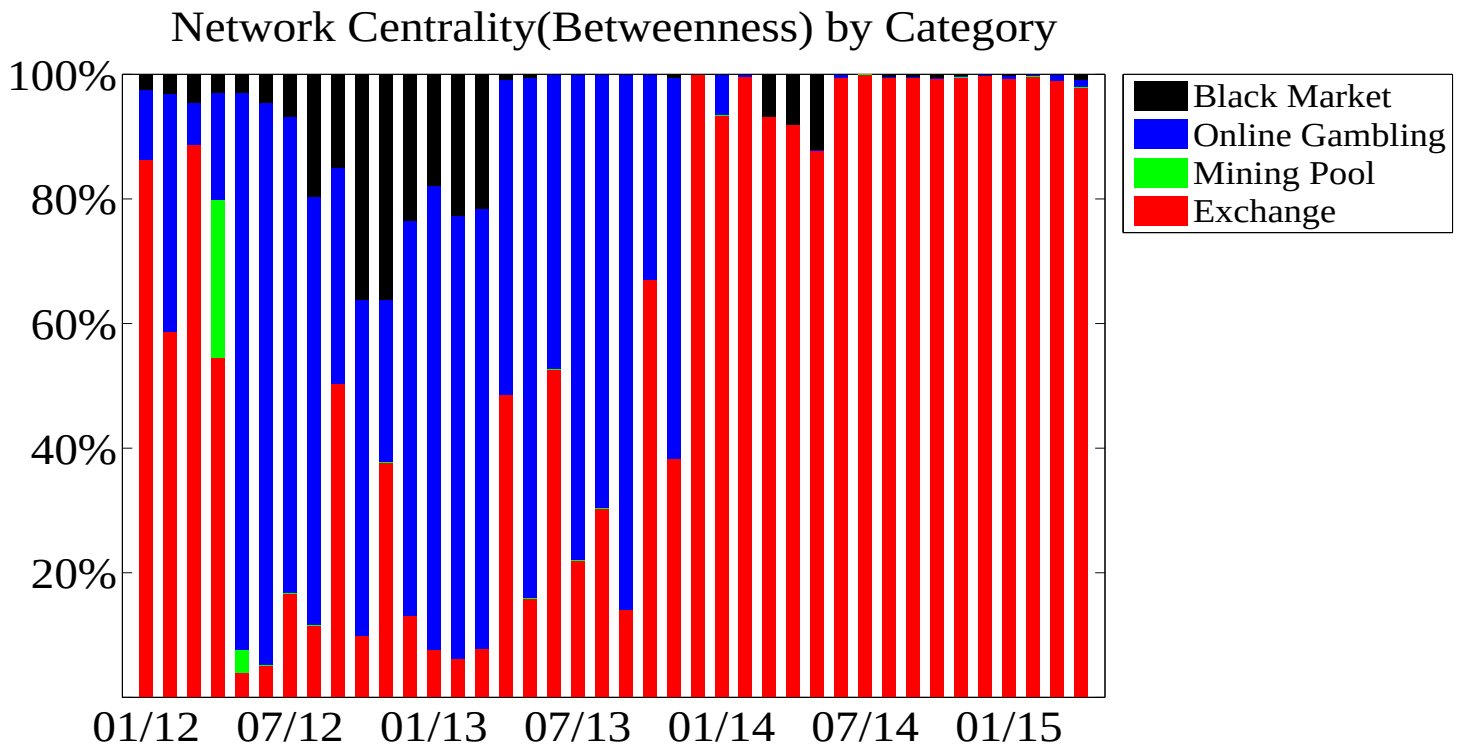


Figure: Plot of the evolution of the centrality of the business categories in the Bitcoin network, monthly from January 2012 through May 2015.