Bitcoin and ASIC Mining

Monterosso Investment Management Company, LLC

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Disclaimer

- Past performance is not necessarily indicative of future results.
- Investments are speculative and involve a substantial risk of loss.

Executive Summary

- Bitcoin (BTC) is the world's first decentralized cryptocurrency.
- The history of bitcoin is short, but fascinating.
- There exists an opportunity to mine this virtual currency.
- We will use certain metrics to determine if bitcoin mining is profitable.
- Also, we will use a model to value ASIC mining machines.
- Our conclusion is that, as an investment, ASIC hardware has a favorable risk/reward profile.

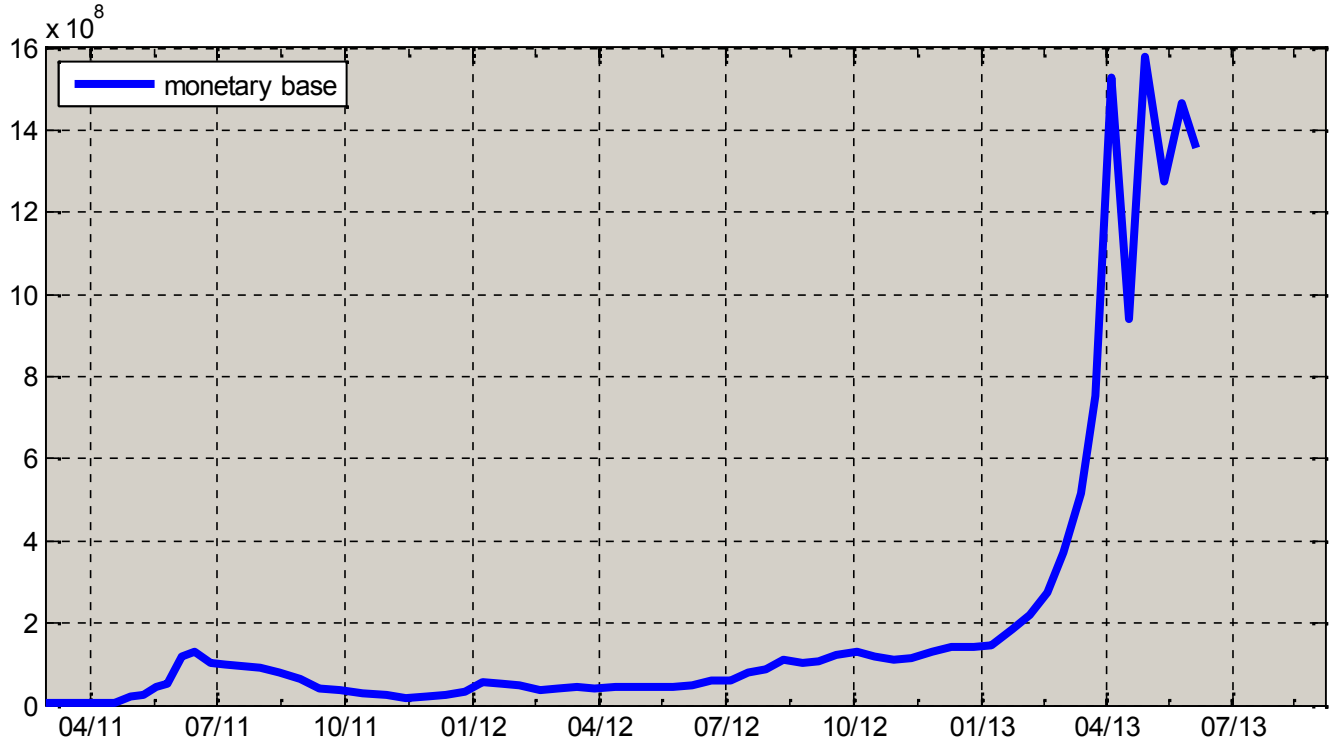
Part I

An Introduction

What Is Bitcoin?

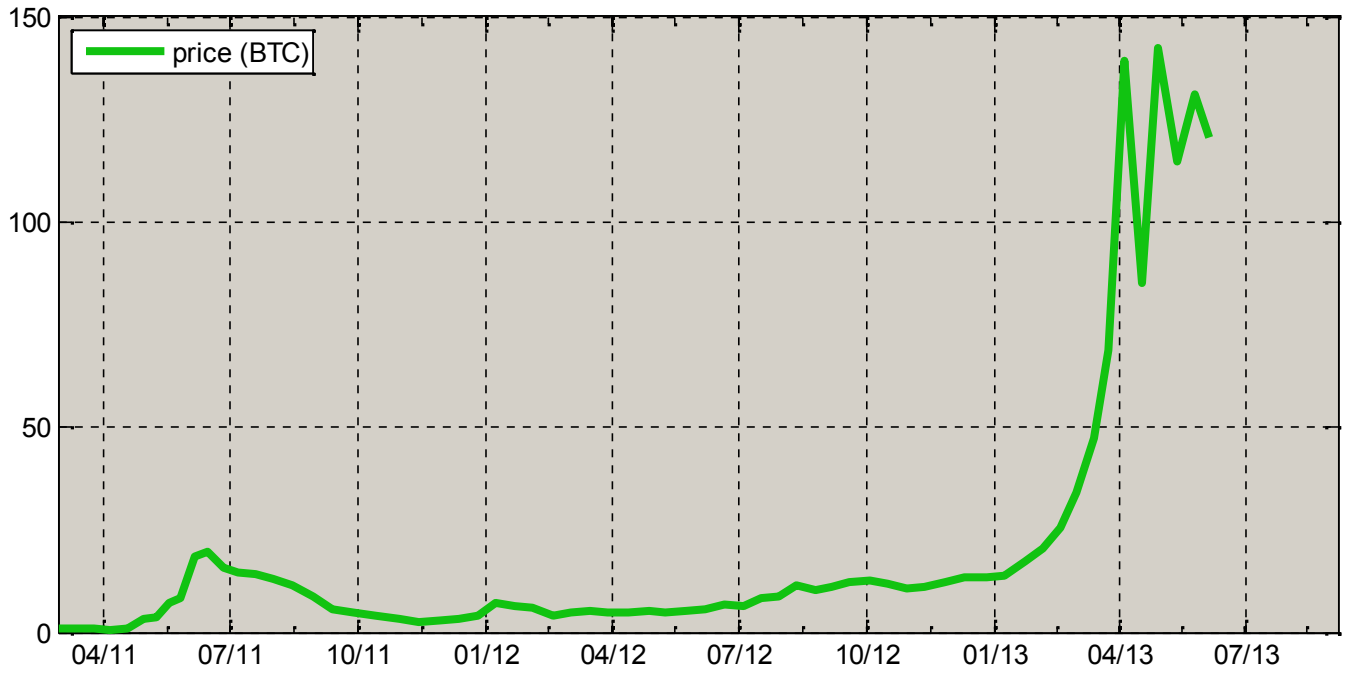
- Bitcoin (BTC) is the world's first decentralized cryptocurrency.
- The bitcoin protocol was first described in a 2008 paper by pseudonymous developer Satoshi Nakamoto. The first block of bitcoins was mined in January 2009.
- The processing of bitcoin transactions is secured by servers called bitcoin miners.
- These servers communicate over a decentralized, internet-based network and confirm transactions by adding them to a ledger which is updated and archived periodically using peer-to-peer filesharing technology.
- In addition to securing the currency, each new ledger update creates newly minted bitcoins. This process of updating the ledger is called bitcoin mining.
- The number of new bitcoins created in each block is halved every 4 years until the year 2140. At that time no more bitcoins will be added into circulation and the total number of bitcoins will have reached its maximum of 21 million bitcoins.
- Monetary base = total number of bitcoins x price of BTC (in USD) = $1.35 billion

Monetary Base



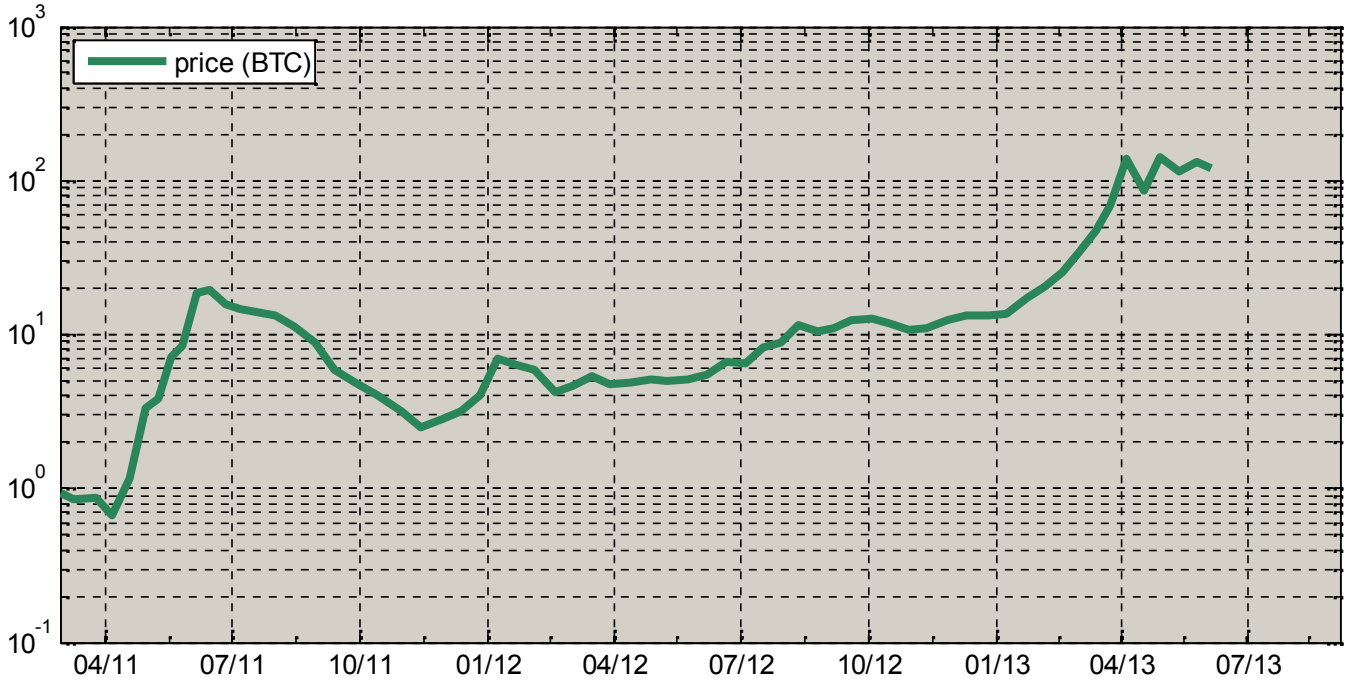
Through 6/5/2013, the monetary base of bitcoin is approximately 1.35 billion dollars.

Price of BTC



Update: as of 6/16/2013, the price of BTC was $100.

Price of BTC (Log Scale)



The run-up in price looks much less parabolic in log scale.

How Does Bitcoin Work?

- Bitcoins can be transferred on your computer or smartphone without the need for a financial intermediary.
  - Credit card transactions cost 3%; bitcoin transactions cost nothing.
- Each bitcoin is divisible down to eight decimal places.
  - 1 Satoshi = 1/100 millionth of a bitcoin.
- Every twelve days, 2016 blocks x 25 bitcoins are created to compensate miners for confirming blockchain transactions.
- Thus, 50,400 bitcoins are created every 10-12 days. These 50,400 coins are paid to bitcoin miners to as a reward.
- At current BTC prices, 50,400 bitcoins = $5,500,000. Divide that by 10 or 12, and we see that, in the aggregate, the reward paid to miners is approximately $500,000 per day.

Part II

A Brief History of Bitcoin

A Brief History of Bitcoin

- 10/31/2008 – Satoshi Nakamoto publishes a white paper describing the bitcoin protocol: http://bitcoin.org/bitcoin.pdf
- 01/2009 – The first bitcoins are mined.
- 12/30/2009 – At 06:11:04 GMT … the first difficulty increase.
- Laszlo buys two large pizzas from jercos with bitcoins for 10,000 BTC, which was worth $25 then and $1,000,000 now.
  - https://bitcointalk.org/index.php?topic=137.msg1195#msg1195
  - http://heliacal.net/~solar/bitcoin/pizza/
- 10/01/2010 – First public OpenCL mining software released.
  - This allows for parallel computing across CPUs and GPUs.

A Brief History of Bitcoin

- 11/06/2010 – The monetary base passes $1 million.
- 11/06/2010 – The price of BTC touches $0.50.
- 12/07/2010 -- Bitcoind is compiled for the Nokia N900, enabling the first portable (i.e., on a mobile phone) transaction.
- 12/16/2010 – Slush's Pool finds its first block:
  - http://mining.bitcoin.cz/
- 02/09/2011 – Bitcoin reaches parity with USD.
- 06/02/2011 – Price of BTC touches $10.
- 07/22/2011 – The first bitcoin app for iPad is released.
- 09/2011 – First Bitcoin conference in London.

A Brief History of Bitcoin

- 09/27/2011 – Formation of the Bitcoin Foundation:
  - https://bitcoinfoundation.org/
- 11/15/2012 – Wordpress starts accepting bitcoin.
- 11/28/2012 – Halving day. Block 210,000 is the first with a block reward of only 25 BTC.
- 02/28/2013 – The BTC price breaks $31.91, making its first all-time high in 601 days.
- 03/05/2013 – Namecheap (domain registrar) starts accepting bitcoin.
- 03/18/2013 – FinCEN releases FIN-2013-G001, which states that bitcoin users are subject to regulation only when exchanging bitcoin for other currencies.
  - http://fincen.gov/statutes_regs/guidance/html/FIN-2013-G001.html

A Brief History of Bitcoin

- 03/28/2013 – Monetary base passes $1 billion
- 04/01/2013 – Price of BTC passes $100.
- 05/17/2013 – First day of second annual bitcoin conference.
  - The conference is held in San Jose, in the same room where the 1994 Internet Marketing Conference was held.
- 06/13/2013 – Butterfly Labs announces that they have started shipping all of their smaller model (5 GH/s - 60 GH/s) machines.
  - The larger 500 GH/s machines will follow.
- Link to Bitcoin 2013 presentations and panels:
  - https://www.youtube.com/playlist?list=PLUOP0P68GJ3BGjfqoLLnzAefk3ZzXQtJ7

Part III

Understanding Mining Metrics

Introduction to Mining

- Remember, the processing of bitcoin transactions is secured by servers called bitcoin miners.
- In addition to securing the currency, each new ledger update creates newly minted bitcoins. This process of updating the ledger is called bitcoin mining.
- Mining pools are paid in bitcoin as a reward for their work.
- Mining difficulty is measured by two statistics:
  - Difficulty
  - Total network hashrate
- Mining profitability is measured by one statistic:
  - Gigahash Standardized Units (GSUs)
  - GSU is a measure of how much profit (in dollars) one GH/s of processing power makes in one day.

GSU = Mining Profitability

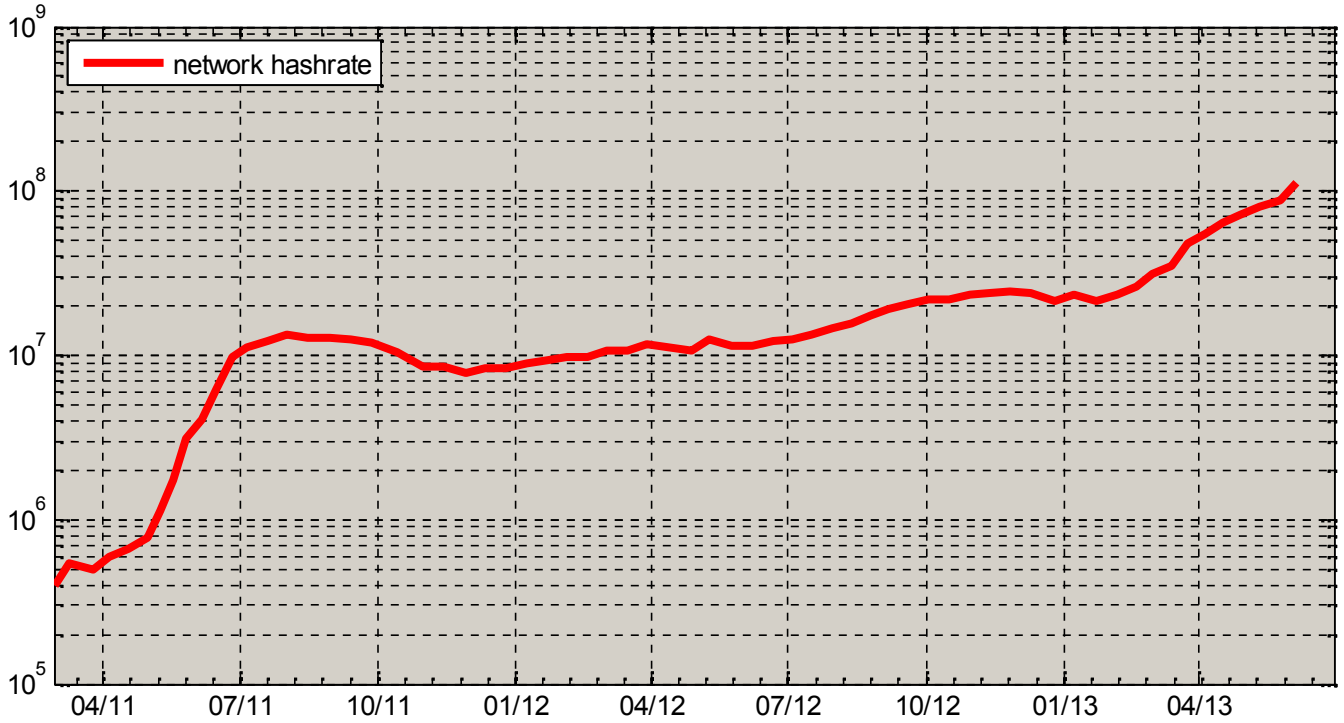
- Gigahash Standardized Unit (or GSU) is the amount of dollars earned per day with one GH/s of processing power.
- GSU is calculated from three inputs:
  - Bitcoin Added per day
  - Total Network Hashrate
  - Price in Dollars of BTC
- The formula for calculating GSU is as follows:

  [GSU = Bitcoin Added per day / Network Hashrate in GHs] * the Price of BTC
- As of 6/5/2013, GSU = $4.99

Difficulty Since March 2011

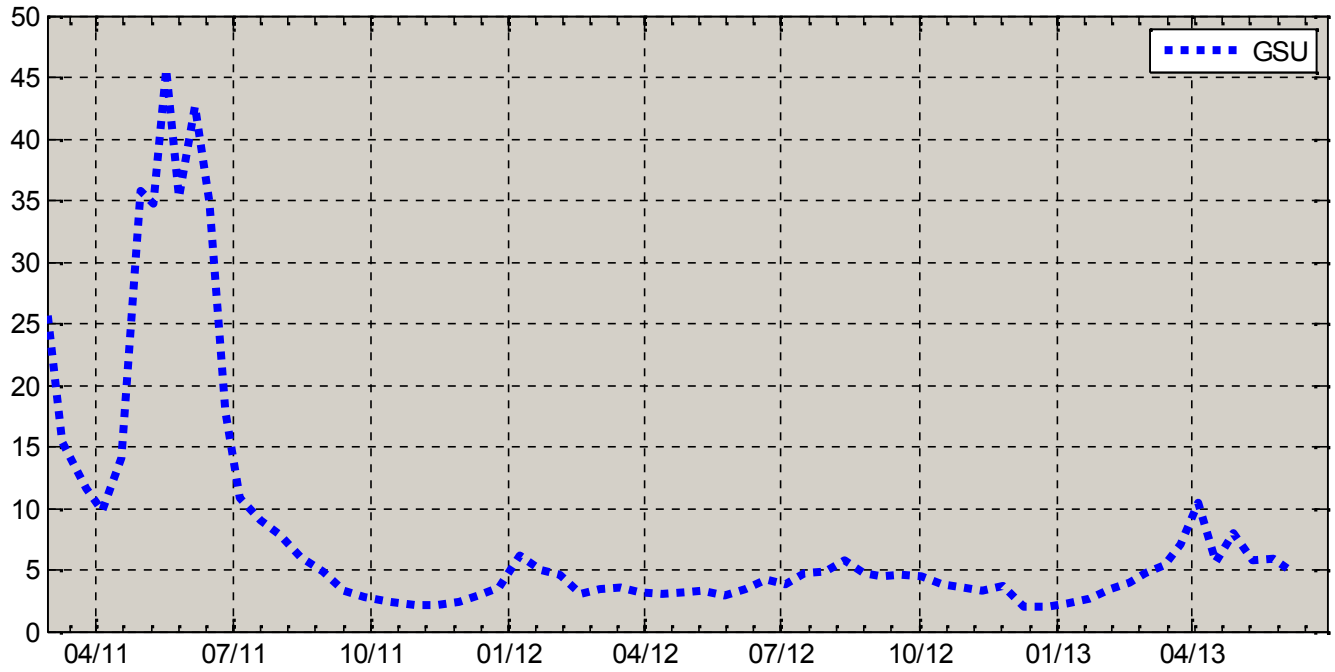
Difficulty is derived from total network hashrate.

Network Hashrate (Log Scale)



Total network hashrate will increase exponentially over the next three months.

GSU Since March 2011



Since Late 2011, GSU has stayed within a range of $2 and $10.

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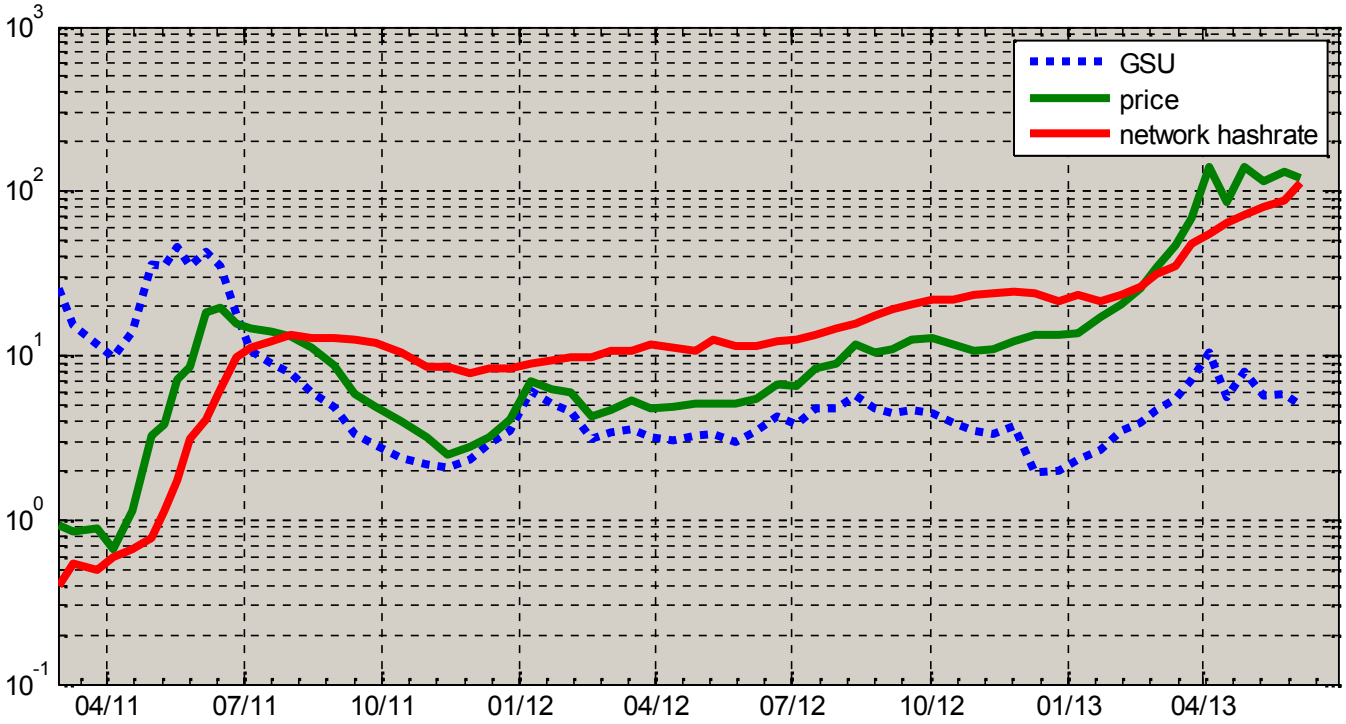
Everything in Log Scale



Plotting everything in log-scale, we can see how they relate to each other.

The Relationship between Price and Difficulty

- Price and difficulty (and/or total network hashrate) are positively correlated.
- However, just by eyeballing the chart on the previous slide, you can tell that increases in network hashrate tend to lag increases in price.
- Also, total network hashrate is sensitive to price increases but highly insensitive to price decreases.
- We believe that it would be incorrect to argue that increases in total network hashrate cause increasing prices. There is no evidence of that in the data.
- In other words, it is entirely possible for prices to drop even while network hashrate increases exponentially.

Part IV
Valuing ASIC Hardware

(assuming an 8/1/2013 delivery date)

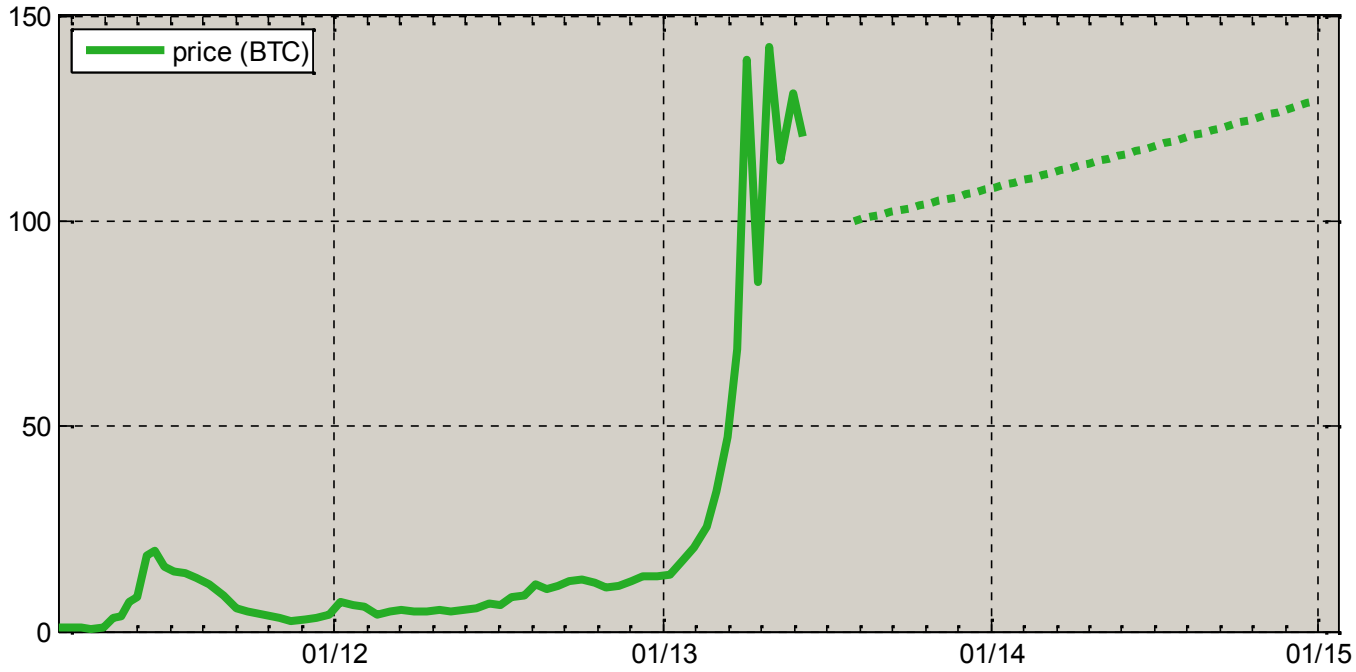
Things to Consider When Building a Valuation Model

- Mining profits depend on two inputs:
  - Price
  - Total Network Hashrate
- There are a few other things to consider here:
  - i. The useful life of ASIC mining machines is only 18 months.
  - ii. The price of BTC will tend to go up over longer timeframes.
- Our approach is conservative. We assume that the price of BTC starts out at $100 on 8/1 and increases by 20% per year thereafter.
- We make our hashrate predictions based on our knowledge of the industry.
- It is worth noting that the mining machines are so much more productive in the beginning of their useful life that our results will depend primarily on earlier prices and almost not at all on future price appreciation.

What Determines the Price of BTC?

- As with precious metals, the cost of mining should set a floor on the price of BTC.
- This is because if the price of BTC drops below the break-even price for the mining community, mining participants will stop mining and buy BTC instead.
- Likewise, as mining margins decrease, we can expect the price of BTC to become more stable because many would-be miners will be much more inclined to become long-term investors in BTC itself instead of investing in mining hardware.
- However, as the cost of mining decreases, the break-even point for mining decreases.
- So long as the cost of mining remains low and mining margins remain high, we are concerned that there exists a significant risk of short-term price shocks in BTC.
- Over longer timeframes, the primary driver of BTC prices will be adoption rate.

Projected Future Prices of BTC



We assume no change until 8/1 and 20% annualized appreciation thereafter.

Can We Predict Changes in Hashrate?

- Demand for ASIC machines is very high, even at current prices.
- But there is a limited supply of ASIC mining machines.
  - All of the manufacturers have seen production delays.
  - The Avalon chips might never even make it to market.
- Current total network hashrate is 111 TH/s as of 6/5/2013
- BFL will supply at least 200 TH/s of processing power by 8/1.
- There is another 50 TH/s of processing power coming in August.
- Avalon might supply another 20 TH/s by then.
- Our predictions are based on our inside knowledge of the industry. Without such knowledge, making predictions would be quite difficult.

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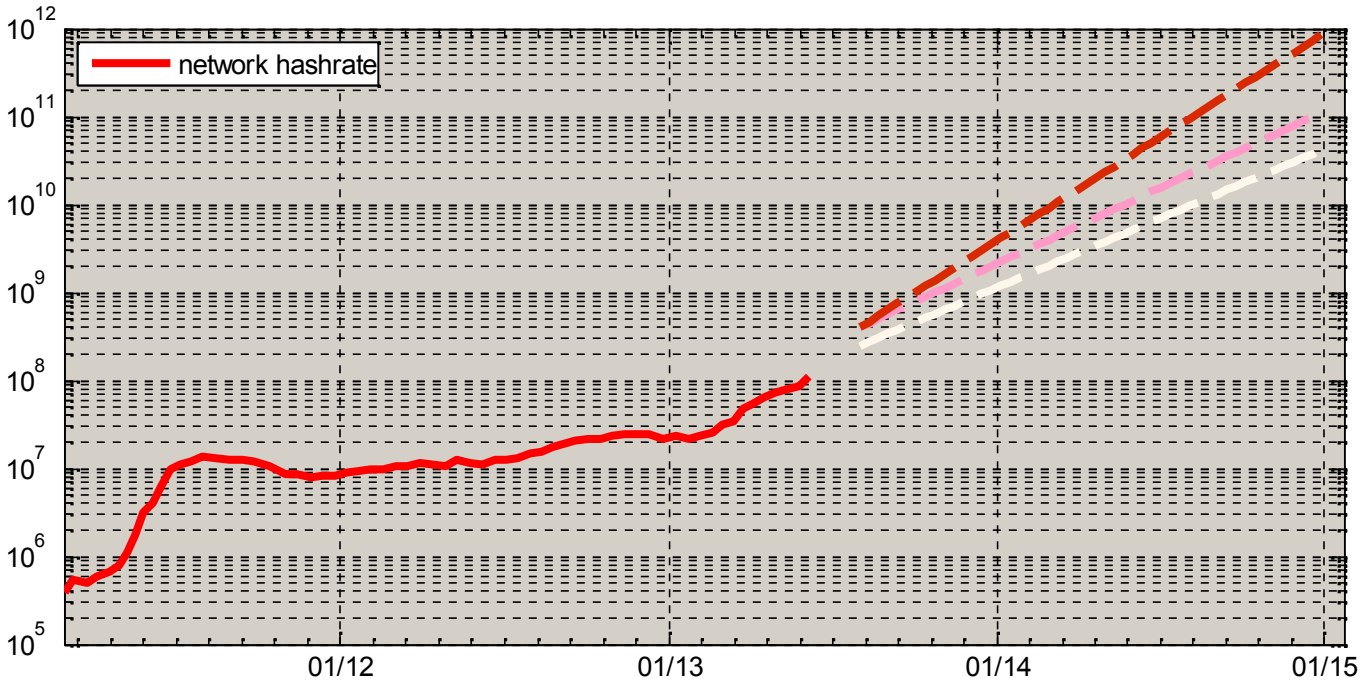
Projected Future Total Network Hashrate



We will look at three different scenarios for hashrate growth.

The Assumptions for Our Model

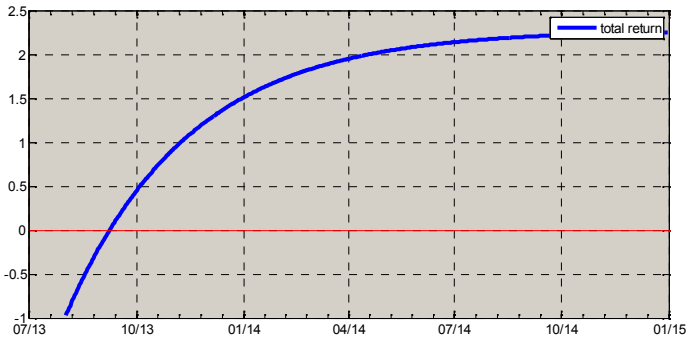
- Our model assumes the following:
  - Investors take delivery of their machines on 8/1.
  - Investors pay $50 per GH/s for their ASIC mining machines.
    - $50 per GH/s is the current fair market value of ASICs.
    - We expect mining machines to become less and less expensive as mining profit margins decline over time.
  - As of 8/1, the price of BTC will be at $100.
  - The price of BTC will appreciate by 20% per year thereafter.
  - The average retarget period will have a length of 10.5 days.
- Most important, we assume that there will not be widespread adoption of bitcoin as a currency within the next 18 months.

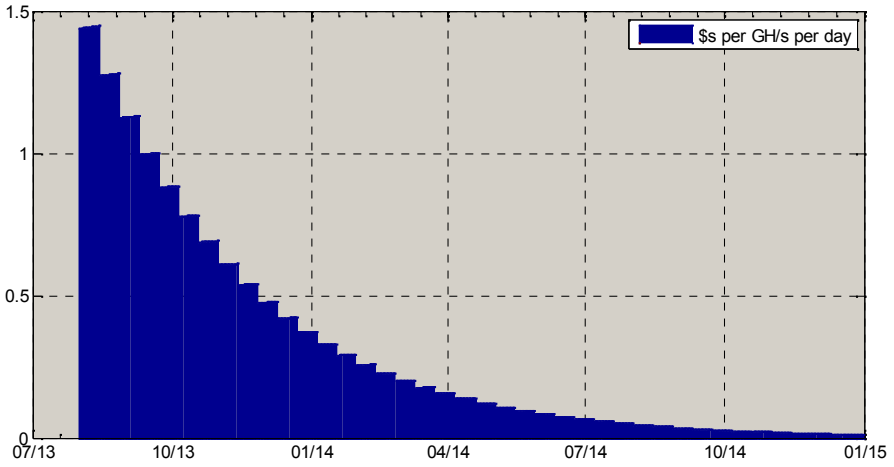
Three Scenarios and Their Inputs

- Best case:
  - As of 8/1, total network hashrate = 250 TH/s
  - Growth rate = 1% per day thereafter
- Worst case:
  - As of 8/1, total network hashrate = 415 TH/s
  - Growth rate = 1.5% per day thereafter
- Expected:
  - As of 8/1, total network hashrate = 415 TH/s
  - Growth rate = 1.1% per day thereafter

Estimated Returns – Best-case

- Break-even point: One month and eight days
- Three-month ROI: 88.92%
- Six-month ROI: 167.33%
- Total-return: 217.24%

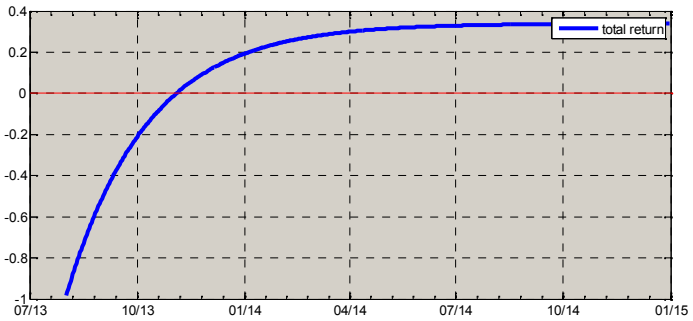


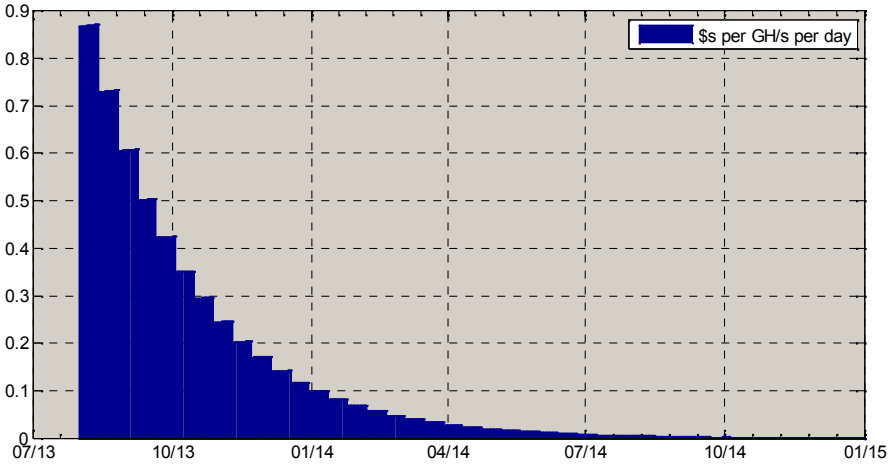


Best-case Scenario

Estimated Returns – Worst-case

- Break-even point: Three months and four days
- Three-month ROI: -3.25%
- Six-month ROI: 21.61%
- Total-return: 25.75%

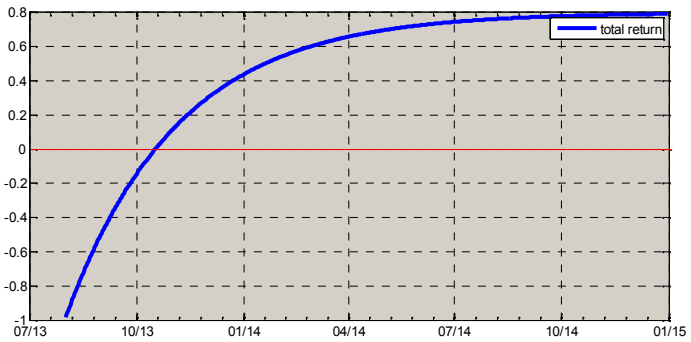


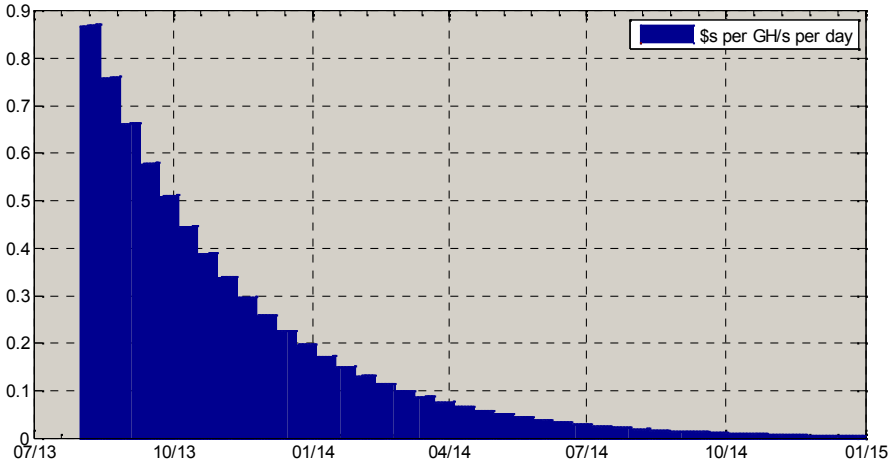


Worst-case Scenario

Estimated Returns – Expected

- Break-even point: Two months and seventeen days
- Three-month ROI: 9.56%
- Six-month ROI: 50.72%
- Total-return: 71.00%





Expected Return = 42.99% annualized

ASIC Mining – Our Conclusion

- The opportunity to invest in ASIC mining machines presents a favorable risk/reward profile.
- For investors who are concerned about inflation, bitcoin is probably a good long-term investment.
- If investing in bitcoin is a good hedge against inflation, then investing in ASIC mining machines is an even better hedge against inflation.
- At current prices, investing in ASIC mining machines is like buying bitcoin at a 40% discount.
- If there is widespread adoption of bitcoin in the future, then the price of BTC will increase exponentially.
- Buying bitcoin at a 40% discount is probably a wise thing to do.

Appendices

Appendix I – Sources

- Timeline: https://en.bitcoin.it/wiki/History
- My spreadsheet for calculating difficulty:
  - monterossoinvestments.com/difficulty.xls

Appendix II – Contact Information

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