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# MIT Bitcoin Trading Simulation Yields Profit of 89% in 50 Days

Joon Ian Wong (@joonian) | Published on October 14, 2014 at 15:38 GMT

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Trading bitcoin profitably remains more of an art than an exact science.

On any given day, Reddit is awash with theories explaining bitcoin price movements, ranging from exotic technical indicators to the machinations of FUD (fear, uncertainty and doubt) peddlers.



That may change, however, with a new paper that claims to have devised a trading strategy that can produce an 89% return in less than two months.

The authors, Massachusetts Institute of Technology associate professor Devavrat Shah and computer science student Kang Zhang, collected data from OKCoin, the world's largest exchange by trading volume, from February to July.

They fed the data into a predictive statistical model they have developed and used the results to conduct a simulation of CNY/BTC trades. In the simulation, the trader could only go long or short 1 BTC in each trade.

## Volatility boosts profits

The trading simulation, conducted on data taken from 50 consecutive days in May and June, produced highly profitable results. The simulated trader invested 3,781 yuan and made 2,872 trades. The total cumulative profit was 3,362 yuan, or an 89% return on the amount invested.

The trading strategy produced the greatest profits when volatility was high, in the period at the end of May and the start of June, and was still profitable when the price declined steadily at the end of the simulated period.

The trading strategy also produced a Sharpe ratio of 4.1, the authors write. This expresses a portfolio's return after adjusting for the risk-free rate of return. A high ratio shows that an investor produced returns while taking on less risk, with scores of three and over being considered excellent.

The authors' Sharpe ratio compares favourably to benchmark mutual funds, like the Vanguard Total Stock Market Index Fund, the world's largest such vehicle, which is worth \$355bn. That fund has a one-year Sharpe ratio of 1.79 and has returned 8.32% in the last year.

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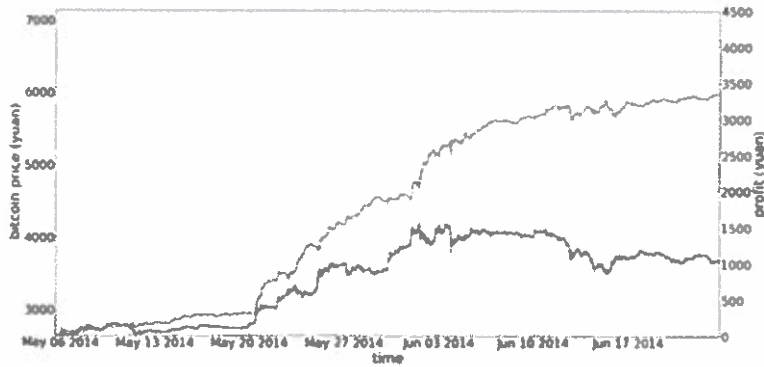
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Blue line = bitcoin price on OKCoin. Black line = trading profit. Source: Bayesian Regression and Bitcoin, Fig. 3

### Peering into the data

The paper's results may also support the claims of technical traders in bitcoin markets. The authors analysed their prediction data and found evidence of 'triangle' and 'head and shoulders' patterns in the price charts.

"This seems to suggest that there are indeed such patterns and [...] explains] the success of our trading strategy," they write.

A preliminary version of the paper, titled *Bayesian Regression and Bitcoin*, was published in the *Proceedings of the 2014 Allerton Conference on Communication, Control and Computing* – one of the longest-running and most prestigious conferences in its field. The three-day conference concluded on 3rd October.

Given the simulation's restricted trade size of 1 BTC, could more money be made with more capital at stake? The authors write that more research is required, although they speculate that profit can be magnified.

The authors also note that further profits could be produced by crunching more data, although this would require "computation at a massive scale". They used a 32-core machine with 128GB of RAM for the study and "representative" time-series data at the predictive modelling stage.

### Origins in Twitter analysis

Shah and Zhang's predictive simulation is based on a 'latent source model' that was described in a paper published last year and was designed to predict what would become 'trending topics' on Twitter.

Shah co-authored that paper with two researchers at MIT and Twitter. Their model was able to predict trending topics accurately up to 79% of the time, according to the authors.

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### \$2,500 a Month'

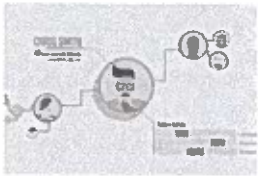
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iraszl • 20 days ago

In simulation you can do this. Especially if you know the data and build your algo to fit it.

Once you actually start trading thousands of times a month with at least 100 BTC to make it worth your time and effort you will influence the market with your trades and thus the algo won't work as efficiently.

As the volumes and value of BTC grows, Wall Street trading algos will be unleashed on the Bitcoin market and the average folks will only have one good strategy for trading: Hold for long.

40 ^ ▾ • Reply • Share ▾



Wong Joon Ian Mod → iraszl • 19 days ago

Why are Wall Street algos more efficient than MIT ones?

1 ^ ▾ • Reply • Share ▾



iraszl → Wong Joon Ian • 19 days ago

Wall Street firms have billions at stake. They perfected their trading algos over and over to absolute possible perfection for current technology over the years. They race each other for milliseconds literally. Even the location of a server within the server room matters. They attracted top talent from all over the World. They already made billions of real dollars on the stock market.

Based on the article the MIT guys haven't even extrapolated their algo to over 1BTC transactions and haven't tried it in the real world yet.

I think it's reasonable to assume that the Wall Street guys are better at it.

13 ^ ▾ • Reply • Share ▾



K128kevin → iraszl • 19 days ago

Hev Ivan, i don't know a lot about wall street trading algorithms but I

think that what you are saying kind of implies that there is no room for improvement. I Think that this is almost never true of any science or practice. The people on Wall Street may have extremely effective strategies for trading, but I am 99.9999% sure that it is possible to come up with something better. Way more "impossible" feats have been proven possible throughout history. And btw I'm the guy who you spoke to briefly a while back about btcpredictions.com.

2 ^ | v · Reply · Share ·

**Nevermark** → K128kevin · 18 days ago

Algorithmic trading is intensely competitive and continually advancing. Any edge they find only lasts until someone else finds it to. This is one case where existing players are leagues ahead of amateurs. Bitcoin is different? That is all these people do every single day, find differences and exploit them, using mathematics, computing, and communications into markets at a level you cannot imagine if you are not familiar with the industry.

This is one case where an amateur is extremely unlikely to do better outside of getting lucky or trading long term.

^ | v · Reply · Share ·

**Clément Francomme** → iraszl · 18 days ago

Yeah but in bitcoin, the market reaction is not the same as in 'real world' just because there is not the same mechanisms. Second point is that Wall Street algos are not yet interesting to use on a market that is as small and illiquid as bitcoin. I would be happy to see these guys coming in the BTC space but it's not yet. (happy because i believe that the more bitcoin transaction there is, by any means, the better. As long as it generates fees somewhere, not as in China where there is almost no fees anymore).

1 ^ | v · Reply · Share ·

**darl** → Wong Joon Ian · 19 days ago

because one is reactive, and uses a selected slice of historical data, and the other is proactive, and uses real time data, and operates in the real world. How can you draw any conclusions about MIT's algo, they get to know the results before they start, and select a narrow data set that will confirm thier method, but not test it.

Simulated trade on selected historical data, is not the same as a simulated trade in real time.

Try that algo starting now, and see if you turn that profit in a month of simulated trading. Good luck.

3 ^ | v · Reply · Share ·

**Wong Joon Ian** Mod → darl · 19 days ago

I was asking about the OP's assertion that once 'wall street trading algos' are 'unleashed' on the xbt markets, all the profits will disappear. Why does OP think algos devised by 'wall street' are inherently more efficient than algos devised by MIT? After all, plenty of Wall St quants are from MIT. Of course simulated trades etc etc are all valid points, but that wasn't my question.

2 ^ | v · Reply · Share ·

**darl** → Wong Joon Ian · 19 days ago

I don't see where is says "all profits will disappear", he said it will be less efficient, because marking movement from that trading is not accounted for.

So I think he's saying the MIT algo in not taking into account the effect of the algo on the market, and "wall street" does, because its real time and not historical.

Wall street algo are real time, and real market. I am sure a lot of quants are from MIT that work at wall Street, but its people from MIT, not MIT itself.

1 ^ | v · Reply · Share ·

**Wong Joon Ian** Mod → darl · 19 days ago

Right. It's that Wall Street secret tech sauce. It's like how Sergey Aleynikov learned all his software chops at Goldman.

1 ^ | v · Reply · Share ·

**preferrous** → Wong Joon Ian · 19 days ago  
Can you read?

^ | v · Reply · Share ·

**Michael Thompson** → iraszl · 18 days ago  
You are mostly right although the one good strategy could be Short for the long-term, instead.

^ | v · Reply · Share ·

**Rogue Wave** → iraszl · 20 days ago  
Exactly, no market impact and no account of front-running or knowledge of target fiat exit instrument. But if someone wants to look into volatility and correlated assets, today you need look no further than any popular fiat instrument, like say Crude Oil,

^ | v · Reply · Share ·

**MEMBER 7291** · 19 days ago  
Wait, you mean if I fit a model to historical data, I can produce backtested strategies that always make money in the past?

9 ^ | v · Reply · Share ·

**Martin Cataldi-Rogers** · 20 days ago  
if you buy at 275 sell at todays 401 , and buy back in at 330 and resell at 399 thats good enough profit

5 ^ | v · Reply · Share ·

**Neurorit** → Martin Cataldi-Rogers · 19 days ago  
I could very well be wrong but considering it cost nearly 600\$ to produce one Bitcoin (hardware+electricity) it's not going to remain undervalued enough to dip back into that range anytime soon.

1 ^ | v · Reply · Share ·

**Scott Schechter** → Neurorit · 19 days ago  
The cost to produce is irrelevant. It just means miners will continue to lose money

1 ^ | v · Reply · Share ·

**Kirk Hilles** · 19 days ago  
Gee, where to start. Putting data into a program and come up with a formula that returns 89% in 50 days means nothing. I could do FAR better than that with Forex and show something that returned 100%, 1,000% maybe even far higher than that in that period. It means nothing, because if you run enough variations you'll find one that matches the curve. Use that formula for 6 months in the future and you'll be in the negative - maybe completely broke.

Bitcoin isn't good for day trading right now. Difficult to short, high spreads and volatile price. Price will be stable for awhile and then have major surges up and down. You aren't trading something like fiat where over \$3 trillion is traded daily.

I love Bitcoin, but unless you are willing to manipulate the market, don't get into day trading with it at this point. Buy and Hold.

4 ^ | v · Reply · Share ·

**TokyoWomenAreAmazing** · 19 days ago  
"Long or short 1 BTC"... Sure, believable, and easy... Having said that, their 1BTC is not a big deal, and the profit shows nothing and virtually is nothing... If they can manage that with 10k BTC, I'd be impressed. If they could even feasibly do 1k BTC, I would be highly interested, but the fact is, with larger volume at any given time, the markets just aren't currently deep enough for this to be feasible. Take the bear whale the other day as a good example of that... It took several hours for that almost 30k BTC order to even liquidate 30% on the largest exchange and it was a huge media spectacle, thereby affecting the entire market in turn.

3 ^ | v · Reply · Share ·

**darl** → TokyoWomenAreAmazing · 19 days ago  
damn straight, and to be compared to a \$355B market is a bit odd.

^ | v · Reply · Share ·

**Sada Marksys** · 20 days ago  
Paid-for article... Just to pump up the price and convince people to buy bitcoins

and for article: just to pump up the price and convince people to buy bitcoins.  
3 ^ | v · Reply · Share ·

**Wong Joon Ian** Mod → Sada Marksys · 19 days ago  
paid for by...?  
2 ^ | v · Reply · Share ·

**preferrous** → Wong Joon Ian · 19 days ago  
your paymasters.  
^ | v · Reply · Share ·

**darl** · 19 days ago  
I simulation on historical data, and they were able to turn a profit, way to predict the past, impressive work.  
Now lets see you do it, without a carefully selected data set, and real time, in the real world, good luck.  
5 ^ | v · Reply · Share ·

**preferrous** · 19 days ago  
> used the results to conduct a simulation of CNY/BTC trades

So basically you're saying they picked the fiat-btc pair with the least believable volume+trade data?

Sounds legit.  
2 ^ | v · Reply · Share ·

**Sinemetu** · 20 days ago  
HODL you suckers! :D  
2 ^ | v · Reply · Share ·

**disqus\_cvhbHILpDs** · 20 days ago  
One of 3 things will happen in my opinion:

- 1: Bitcoin trading will remain highly profitable as there are few "smart" traders as compared to traditional markets.
- 2: Bitcoins price will drop to the point where possible speculative profits are incredibly high.
- 3: More traders and speculators enter these markets until it becomes difficult for amateur traders/speculators to profit, which implies much higher bitcoin prices.

Or we swing between these options over time, but number 3 looks like the best and most likely in my opinion =>  
2 ^ | v · Reply · Share ·

**valentino** → disqus\_cvhbHILpDs · 20 days ago  
If 1 bitcoin is \$5000 or more you can expect the price go up and down \$75+ multiple times a day,if you hold 10 Bitcoin now and ride those small waves(use Bitcoinwisdom or simular) you will make a living out of it,if the price will be \$50000 or more the small ups and downs will be like \$200 or more,if you buy and sell those waves my god you will make a lot of money per month!it only takes time till this moment will arive,and you can stop working for your asshole boss that pays you survival money,think about it,sell your stuff you have in your home you dont use and buy Bitcoin,10BTC or 20 BTC is enough to earn a lot of money in 5 years time!Just hold and wait til there is lots of volume in trading and then start this process,be patient.  
1 ^ | v · Reply · Share ·

**iraszl** → valentino · 20 days ago  
The only problem is that once BTC is worth 5K you will have more professional traders entering the trading market bringing in tools and funds you can't compete with. Hold will be the only game in town for normal folks.  
8 ^ | v · Reply · Share ·

**valentino** → iraszl · 20 days ago  
Does not matter,if we have 100000+ traders everybody have diffrent entry points off buy and sell there will be lots opportunities to ride the wave's,even if the wave's are as small like \$25 you still can make a lot of money per month with 10Btc.A few months ago we had wave's of \$10 many time's per day,if you do 2 trade's of 10BTC thas still  
\$200 per day till \$2000 ----- that a lot of money that you that

\$200 per day, still \$5000 per month, but a lot of people don't earn that kind of money now with there job.

2 ^ | v · Reply · Share ·

**darl** → valentino · 19 days ago

and those people don't have to have millions of dollars tied up in bitcoin's to make that \$200 bucks a day either!

^ | v · Reply · Share ·

**darl** → iraszl · 18 days ago

and if everyone 'holds' bitcoins, what are they then good for ? They need to have value because they are useful, if people buy and hold, they are not useful.

^ | v · Reply · Share ·

**iraszl** → darl · 18 days ago

If everyone holds and there is always a market for more bitcoin would become a great, convenient personal store of value. That's a really important and a great utility on its own.

^ | v · Reply · Share ·

**darl** → iraszl · 18 days ago

if everyone holds who are you buying from, and why would you pay the price you are going to pay, and how does those bitcoins you are holding generate wealth or value?

^ | v · Reply · Share ·

**iraszl** → darl · 18 days ago

What value does a freezer brings? It is able to preserve value over time. It doesn't change the food. It allows the food to be unlocked in the future when it's needed. The value comes from having the food at the right time.

Same goes for bitcoins that do nothing else but act as store of value. The value comes from being able to freeze your work into the future, when you can unlock it for use. For example you save when you're young and agile for times when you're old and in need of help of your younger self.

^ | v · Reply · Share ·

**Clément Francomme** → iraszl · 18 days ago

Well, there is a lot of professionals in the forex market and as an individual it's still possible to have a decent strategy in order to make money from it... So why not bitcoin ?

^ | v · Reply · Share ·

**darl** → Clément Francomme · 18 days ago

because bitcoin is not an individual, nor is it a foreign currency, that is simply no 'use basis' for bitcoin in that market.

Perhaps you need to study a bit about foreign exchange and why it exists and what it does, and its function.

^ | v · Reply · Share ·

**darl** → iraszl · 19 days ago

you have nothing to worry about, it will NEVER happen.

^ | v · Reply · Share ·

**vortex** → darl · 19 days ago

LOL Just like newegg would never take bitcoin? Just like bitcoin would never go above \$100?

4 ^ | v · Reply · Share ·

**Harley Strickly** → valentino · 19 days ago

Bitcoin went back to what it was before a huge crash and you are already talking about \$50,000 per coin. Typical bitcoiners lol

1 ^ | v · Reply · Share ·

**Krogoth Alexander** → valentino · 20 days ago

BTC @ 50,000 you will not see \$200 daily price swings.

1 ^ | v · Reply · Share ·

**Heretic** → Krogoth Alexander · 20 days ago  
 u r right. @50000 the market cap of BTC would be around 1/2 a Trillion USD. At that scale it will be run by professionals and their tools. Huge fluctuations will be uncommon  
 3 ^ | v · Reply · Share ·

**darl** → Heretic · 18 days ago  
 but bitcoin is 'decentralized' its not 'run' by anyone.  
 ^ | v · Reply · Share ·

**Heretic** → darl · 18 days ago  
 Dear friend, I'm talking about bitcoin trading, not bitcoin itself  
 1 ^ | v · Reply · Share ·

**Scott Schechter** → Krogoth Alexander · 19 days ago  
 BTC @ 50k, will cost ~\$50 billion in fees to the miners, per year. Unsustainable when POS alternatives have proven secure in practice without flushing money down a black hole. POW coins, including bitcoin will NEVER reach that level  
 1 ^ | v · Reply · Share ·

**darl** → Krogoth Alexander · 18 days ago  
 so if they are worth \$50,000 each and someone dumps 30,000 coins on the market, that would not change the price of them ? so the bitcoin world would be able to come up with 30,000 times \$50,000 dollars without a problem? what is that \$1.5 billion.  
 ^ | v · Reply · Share ·

**Orchideric** · 20 days ago  
 MIT always shines. No surprise there.  
 3 ^ | v · Reply · Share ·

**Nicolaas Smith** · 20 days ago  
 A model works best on OkCoin because of the frequency of trades: technical analysis formations are mostly well formed and thus submit to easier analysis.  
 Value per trade is very low: a volume of 0.0020 (+/- \$6) often moves the price a little.  
 1 ^ | v · Reply · Share ·


**BongBong** · 18 days ago  
 Why didn't they just form a mutual fund or investor's group instead of crowing about it? This formula will be torn apart and utilized by others for gain instead.  
 ^ | v · Reply · Share ·

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