CoinRoutes

Crypto Market Structure & Best Execution

Debunking Myths Through Data

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Outline

What IS Best Execution?

A Walk Through Some Bitcoin Market Data

Myths Debunked by the Data

Implications for Trading

What IS Best Execution?

Best Execution is the ability to buy or sell a desired amount of something at the lowest or highest possible net price.

Due to the many variables and difficulty in measurement, most people define it in terms of the ***trading process*** utilized. Those variables include:

- Bid/Offer Spread - (difference between bid and offer)
- Fees paid - (to exchanges, brokers, etc)
- Market Impact Cost - (The movement from beginning to end of trade)
- Opportunity Cost - (Costs for waiting to trade, particularly if one's trading intentions have been leaked to the market)

What is Meant by Trading Process?

Trading can be as simple as:

- Calling one dealer, and agreeing to buy or sell (or the digital equivalent of trading on a screen)
- Giving an order to an agent, and letting them decide, where and how to trade

Trading can be as complicated as:

- Trading on several exchanges simultaneously, while comparing quotes with those provided to you by dealers.

Examples of POOR Trading Process (for a large order)

Calling multiple dealers to request a quote at the same time for the same order, or placing the entire order onto an exchange where the public can see it

- ➔ Both create market impact before trading even starts, resulting in very expensive trades

Trading manually on individual exchanges, breaking the order up by hand

- ➔ Exchange prices diverge and converge rapidly, making it impossible for manual trading to be optimal

Let’s Get to the Data:

There are several aspects to Crypto Market Structure that can be illustrated via data:

- Importance of fees relative to spreads
- Full depth of order book characteristics
- Measures of fragmentation and mean reversion
- Comparisons of trading method costs

Importance of Fees Relative to Spreads

In equities, the fees charged by exchanges to remove liquidity are less than 30% of the tick size, but in crypto the fees can exceed 100 times the tick size. The following table puts this in context by showing the average spread posted on several top exchanges alongside their fees: (Spreads calculated by sampled data from CoinRoutes)

Exchange	Avg BTC Spread	Estimated Take Fee	Fee spread ratio	Take Cost	Estimated Make Fee
Coinbase Pro	0.0129%	0.15%	11.627 times	.1565%	0.05%
Kraken	0.0109%	0.10%	9.174 times	.1055%	0.0%
Bitstamp	0.0606&	0.05%	0.825 times	.0803%	0.05%
Binance US	0.0129%	0.08%	6.201 times	.0865%	0.07%
OKCoin	0.0129%	0.07%	5.426 times	.0765%	0.01%
Gemini	0.0349%	0.20%	5.73 times	.2175%	0.075%

Notes on Spread Data

- Fees are a very significant driver of trading costs, being larger than bid offer spreads most of the time.
- While they vary, bid offer spreads on exchanges are between 1 and 6 basis points considering their top-of-book.
    - This table doesn’t show this it, but this is for roughly 1 Bitcoin on average

- The fee differential between maker and taker is an important reason why CoinRoutes uses mostly passive orders. There are other reasons which will be explained later.

Characteristics of the Consolidated Order Book (Bitcoin)

These summary statistics for buying or selling 1000 bitcoin were produced from CoinRoutes Cost Calculator on Sunday afternoon:

Sell 1000 Bitcoin			Buy 1000 Bitcoin		
Best Bid	9500.25		Best offer	9499.9	
Average Sale price (without exchange fees)	9468.3		Average purchse price (without exchange fees)	9526.36	
Average Sale price	9453.68		Average purchase	9540.26	
# of unique executions	553		# of unique executions	504	
Cost Gross	31.95	0.336%	Cost Gross	26.46	0.279%
Cost Net	46.57	0.490%	Cost Net	40.36	0.425%

Characteristics of the Consolidated Order Book (Bitcoin)

For comparison, here are statistics for 2500 bitcoin a couple of hours later on Sunday, produced from CoinRoutes Cost Calculator:

Sell 2500 Bitcoin			Buy 2500 Bitcoin		
Best Bid	9431.63		Best offer	9430	
Average Sale price (without exchange fees)	9298.99		Average purchse price (without exchange fees)	9530.37	
Average Sale price (with Fees)	9284.66		Average purchase price (with Fees)	9544.96	
# of unique executions	2038		# of unique executions	1468	
Cost Gross	132.64	1.406%	Cost Gross	100.37	1.064%
Cost Net	146.97	1.558%	Cost Net	114.96	1.219%

Notes on Book Depth Data

- Exchange liquidity is quite robust & potentially cost effective
  - It is cheaper to trade 1000 bitcoin using smart routing than retail tends to pay.

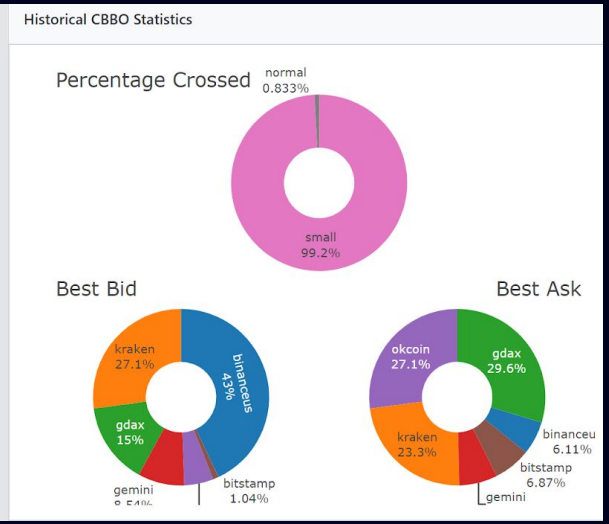
- To SEE exchange liquidity requires software to evaluate THOUSANDS of individual price levels
  - Most systems, not built for crypto, are limited in the size of the book they can process.

- Beyond 2000 Bitcoin, the liquidity does start to thin out
  - This puts a premium on patience (minutes/hours) for working large blocks; It turns out that algorithmic trading outperforms smart routing overall as well, but this explains why market makers charge so much for very large trades.

Importance of Exchange Variance

The following graph shows Bitcoin's best bid and offer among 6 major exchanges for Sunday, May 31st. Notice:

1. The best bid is normally above the lowest offer, but only for a few basis points
2. Exchanges rotate among each other for which one has the best bid and best offer; statistically, there is a strong element of mean reversion, meaning that order placement should always have pan-market data available.



Myths Debunked By Data

Crypto Market Structure is just like FX or Equities

➔ Not true, fees relative to spreads, importance of depth, & fragmentation make it ***very*** different.

Most Bitcoin liquidity is OTC, not on exchanges

➔ Perhaps OTC is the gateway, but exchange liquidity is both significant and publicly available.

Smart Order Routing is Easy, Just Take the Best Price

➔ Not really, the smartest routing uses mean reversion, fee differentials, and fill probabilities to optimize order placement.

Implications for Trading & Trading Technology

- Be aware of relative trading costs and where liquidity is available
- Demand liquidity only when you need to -- If you need immediate execution for a short term strategy, it is reasonable to pay for it. Otherwise, the market is priced better for liquidity providers.
- Data access, while trading, is critical -- ensure that, even when trading on single venues, your order placement is informed by a consolidated view of the market.

Using these concepts, CoinRoutes has delivered ***less than 2 basis points*** *of slippage from the consolidated midpoint price on hundreds of millions of dollars of orders through our system.*