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This is a study to assess the execution quality of FINRA reported trades vs lit-market trades by assessing how far off the NBBO each trade was for thin stocks with fairly wide spreads that trade in the tens of dollars--not the hyper liquid names.

FINRA reported trades are Payment for Order Flow (PFOF), Internalized, and Dark Pool trades. This study will compare FINRA reported trades’ price improvement to the price improvement offered on all the LIT and ATS markets to assess execution quality.

My hypothesis is that PFOF provides dramatically worse prices in illiquid names with fairly large spreads.

The study uses the first 1000 trades each from 33 low volume issues on 11/15/22. These were chosen with a market screener for prices between $10 and $50 and daily volume between 5000 and 25000 shares.

The data comes from Interactive Brokers Python API

Each trade records the price, the volume of the trade, the NBBO, and the exchange of the trade.

The procedure for the study is:

1) For each trade find the smallest absolute value of its price difference from the National Nest Bid (NBB) and the National Best Offer (NBO). I used the standard assumption that trades closer to the offer are buys, while those closer to the bid are sells. The absolute value allows me to sum them.

2) Group the sum of these difference off the NBBO by exchange and sum the total volume grouped by exchange. Divide the sum of the differences by the sum of the total volume by exchange to get the weight per share price improvement off the NBBO for each exchange.

3) Compare them: We can see from the output table that FINRA reported trades are .0055 worse than NYSE, .024 worse than ISLD and a staggering .056 worse than IEX per share.

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| Exchange | Trade count | Total Volume | improvement\_off\_NBBO |
| AMEX | 110 | 5599 | 0.064 |
| DRCTEDGE | 987 | 46701 | 0.084 |
| BEX | 173 | 2878 | 0.093 |
| BYX | 300 | 6702 | 0.094 |
| FINRA | 3006 | 211549 | 0.105 |
| NYSE | 210 | 7090 | 0.110 |
| PEARL | 20 | 876 | 0.118 |
| PSX | 39 | 821 | 0.121 |
| BATS | 675 | 14702 | 0.122 |
| CHX | 56 | 3036 | 0.124 |
| NYSENAT | 59 | 1206 | 0.124 |
| ARCA | 1102 | 33934 | 0.126 |
| MEMX | 244 | 8701 | 0.128 |
| ISLAND | 3999 | 146967 | 0.128 |
| IEX | 997 | 41783 | 0.162 |
| EDGEA | 244 | 5786 | 0.167 |

List of symbols used

SYMBOL,COMPANY NAME,PRICE,CHG,CHG %,VOL

DLHC,DLH Holdings Corp.,$13.30 ,-0.1,-0.75%,6.36K

DSGR,Distribution Solutions Group Inc.,$37.56 ,-0.36,-0.95%,19.22K

EBTC,Enterprise Bancorp Inc.,$34.29 ,0.63,1.87%,13.04K

ECBK,ECB Bancorp Inc.,$16.75 ,0.05,0.30%,14.66K

EDRY,EuroDry Ltd.,$16.19 ,0.19,1.19%,18.41K

EMCF,Emclaire Financial Corp.,$32.65 ,-1.22,-3.60%,5.51K

ENCP,Energem Corp. Cl A,$10.36 ,0.06,0.57%,11.68K

ESSA,ESSA Bancorp Inc.,$21.42 ,0.24,1.13%,13.27K

EVI,EVI Industries Inc.,$18.65 ,-0.14,-0.75%,7.85K

FBIZ,First Business Financial Services Inc.,$39.39 ,0.14,0.36%,16.23K

FET,Forum Energy Technologies Inc.,$28.71 ,-0.06,-0.21%,18.31K

FFBW,FFBW Inc.,$11.75 ,-0.13,-1.07%,5.95K

FGBI,First Guaranty Bancshares Inc.,$23.91 ,-0.19,-0.79%,7.25K

FLXS,Flexsteel Industries Inc.,$15.44 ,0.79,5.39%,14.43K

FMAO,Farmers & Merchants Bancorp Inc.,$28.58 ,0.06,0.21%,18.03K

FNLC,First Bancorp Inc.,$31.20 ,0.3,0.97%,15.77K

FRBA,First Bank (NJ),$15.25 ,0.15,0.99%,17.91K

FRBN,Forbion European Acquisition Corp. Cl A,$10.21 ,-0.01,-0.05%,5.7K

FRST,Primis Financial Corp.,$12.48 ,0.09,0.73%,24.7K

FRW,PWP Forward Acquisition Corp. I Cl A,$10.04 ,0.01,0.05%,24.64K

FSBC,Five Star Bancorp,$28.33 ,0.08,0.28%,19.22K

FSBW,FS Bancorp Inc.,$33.10 ,0.11,0.33%,5.73K

FSFG,First Savings Financial Group Inc.,$23.03 ,0.24,1.05%,8.37K

FSTR,L.B. Foster Co.,$11.00 ,0.07,0.64%,16.71K

FVCB,FVCBankcorp Inc.,$19.87 ,-0.1,-0.50%,18.82K

GECC,Great Elm Capital Corp.,$10.23 ,0.03,0.31%,8.23K

GHM,Graham Corp.,$10.15 ,0.15,1.50%,7.79K

GNTY,Guaranty Bancshares Inc.,$35.80 ,0.4,1.13%,6.84K

GRRR,Gorilla Technology Group Inc.,$10.80 ,-0.63,-5.53%,5.28K

GRVY,GRAVITY Co. Ltd. ADR,$45.27 ,0.36,0.80%,5.11K

HBB,Hamilton Beach Brands Holding Co. Cl A,$13.22 ,-0.52,-3.78%,15.76K

HBCP,Home Bancorp Inc.,$42.63 ,0.35,0.83%,11.49K

HQI,HireQuest Inc.,$16.60 ,1.7,11.41%,19.53K

HSON,Hudson Global Inc.,$22.38 ,-0.06,-0.25%,13.18K

HURC,Hurco Cos.,$25.65 ,0.42,1.66%,6.49K

IESC,IES Holdings Inc.,$33.17 ,0.05,0.15%,9.88K

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