

The Marketability of High-Priced Stocks After Fractional Trading

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INTRODUCTION

What is Fractional Trading and Why Do Brokers Introduce It

Fractional trading allow investors to trade partial shares for the proportional fraction of the stock's price.

Fintech brokers participate in a high-frequency trading payment for order flow (HFT-PFOF) model that compensates them proportional to the trading activity that happens in their accounts. This incentivize brokers to introduce fractional trading to alleviate retail investors' budgetary constraints in hopes of increasing trading activity.

Would Introducing Fractional Trading Increase the Demand for High-Priced Stocks?

Fractional trading gives retail investors the ability to trade high-priced stocks, but are they willing to? Would reducing the nominal price of stocks increase the marketability of high-priced stocks?

If we observe an increase in its demand, this study can provide evidence that the overpricing of high-priced stocks is due to its affordability which is unrelated to firm fundamentals, thus evidence that wealth levels pose a significant determinant for investment decisions.

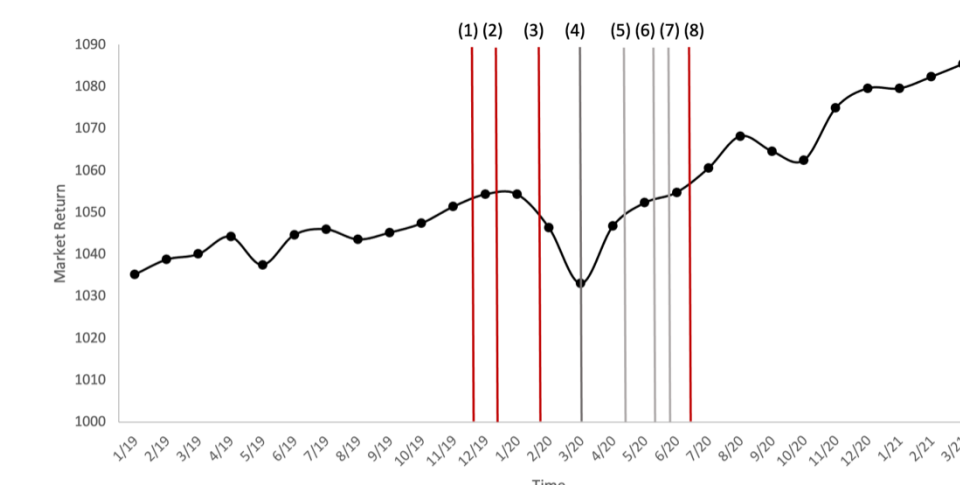
We would expect an increase in stocks' return volatility because retail investors often trade based on noise. Further, a stocks' trading volume and liquidity will also increase as more investors trade with one another.

This study examines the immediate short-term effects of introducing fractional trading on high-priced stocks.

Overview of Fractional Trading Programs

	Interactive Brokers	Robinhood	Fidelity	Charles Schwab
Introduction Date	11/25/2019	12/12/2019	01/29/2020	06/09/2020
Service Rollout Date	Immediately	Incrementally	Immediately	Immediately
Min. Investment	\$1	\$1	\$1	\$5
Investment Universe Constraint	n/a	n/a	n/a	Only S&P 500 stocks
Order Fulfillment	Immediate	Immediate	Not immediate	Not immediate
Order Type	Market/Limit	Market	Market	Market
Orders are Good...	Unless cancelled	Unless cancelled	For trading day	Unless cancelled
Number of Client Accounts	1 M	31 M	37 M	32.1 M
Total Customer Equity	\$200 B	\$20 B	\$10.4 T	\$7.4 T

Figure 1: Timeline of Events



Source: Ken French's Data Library

BACKGROUND

Retail investors are relatively uninformed (without access to private material information) and make unsophisticated trades. It is hypothesized that they often trade on "noise" instead of legitimate news which may cause mispricing to persist due to limits of arbitrage. Their trades are attention-induced, largely contrarian in nature, and often based on stock price levels.

Public firms cater to this notion and engage in stock splits after firms with low-priced (LP) stocks receive high valuations. Stock prices average \$35 since the Great Depression. Two hypotheses explain why investors prefer LP stocks. First, investors overestimate their return skewness and wrongly believe that it's easier for LP than high-priced (HP) stocks to grow. Second, LP stocks are affordable which cause overly-optimistic investors to overinvest in them, causing higher abnormal returns.

The advent of fractional trading (FT) reduces the need for price-based investing and firms are less likely to engage in stock splits to cater to investors' preferences. Indeed, HP stocks grew in popularity after FT was introduced. For instance, the trading volume of Berkshire Hathaway class A shares (BRK.A), which costs over \$300,000 per share, surged in 2021.

METHODS

Empirical Study- Univariate Analyses and Event Studies

We use the Bloomberg Terminal to collect data on high-priced stocks (top 95th percentile of Nasdaq, NYSE, and AMEX stocks) which resulted in 21,483 stock-day observations (cutoff price averaged \$135) over the 10-day event window across four brokers (290 sample size average).

More specifically, we focused our trials on Interactive Brokers because they were the first major broker to introduce FT; Robinhood because they popularized FT by reaching the target demographic (i.e., younger, low-budget investors); Fidelity because they were a more established broker; Charles Schwab because they offered FT in the form of stock slices where the total dollar investment is equally split amongst chosen stocks listed in the S&P 500.

Following Fama, Fisher, Jensen, and Roll (FFJR)'s event study method, we calculated the cumulative abnormal returns (CAR) of stocks to capture stock price reactions since the Efficient Market Hypothesis (EMH) suggests that information is immediately impounded to prices.

Further, we conduct univariate analyses on other stock variables (return volatility, volume, and stock liquidity) to further examine FT's impact. Statistical significance of results are determined by one-sample T-tests.

Using Robinhood's public API (Robintrack), we examine the behavior of retail contrarian trades and its subsequent effect on stocks' liquidity.

We use Stata for analyses, Excel and Python for aggregating, and LaTeX for reporting data.

RESULTS

1. Cumulative Abnormal Return (CAR)

Introducing fractional trading (FT) is an exogenous event that may cause a shock to stock prices, meaning, stock returns outside the norm (i.e., abnormal returns calculated as the security's return in excess of the market). The event studies showed insignificant results with CARs ranging from -0.4% to 0.1%.

Empirically,

$$(1) H_0 : CAR = 0$$

$$(2) H_A : CAR \neq 0$$

$$(3) AR_{it} = R_{it} - R_{mt}$$

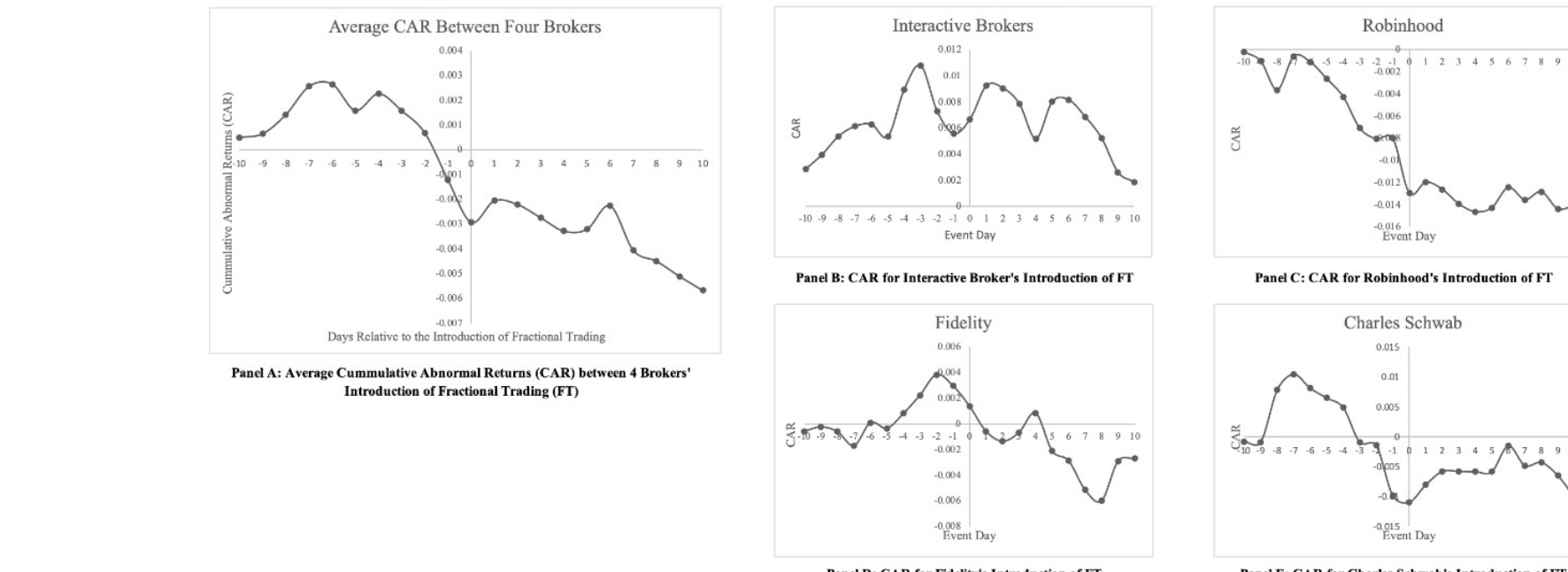
$$(4) AR_t = \frac{1}{N} (AR_{it})$$

$$(5) CAR_{k,t} = \sum_{l=k}^t AR_{it}$$

t statistics in parentheses. * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

where *i* denotes an individual stock; *m* is the market; *t* denotes event date; *N* is the number of securities; *k, l* denotes observation window.

Figure 2: Cumulative Abnormal Returns (CAR) in Four Broker Events



2. Stock Return Volatility

Because retail investors are often perceived as noise traders, their trades positively contribute to stocks' volatility. We measured volatility as the standard deviation of abnormal returns. We find that volatility significantly increased after fractional trading (FT) was introduced when brokers allow FT in the entire securities universe and require a smaller minimum investment.

Empirically,

$$(6) H_0 : VolatilityRatio = 1$$

$$(7) H_A : VolatilityRatio \neq 1$$

$$(8) VolatilityRatio = \frac{\sigma_{preFT}}{\sigma_{postFT}}$$

3. Cumulative Abnormal Volume (CAV)

We slightly modify FFJR's event study method and define abnormal volume as the stock's trading volume in excess of the average volume in the 20 days prior to event date. We find that volume significantly increased during broker events with large number of client accounts.

Empirically,

$$(9) H_0 : CAV = 0$$

$$(10) H_A : CAV \neq 0$$

$$(11) AV_{it} = V_{it} - V_{at}$$

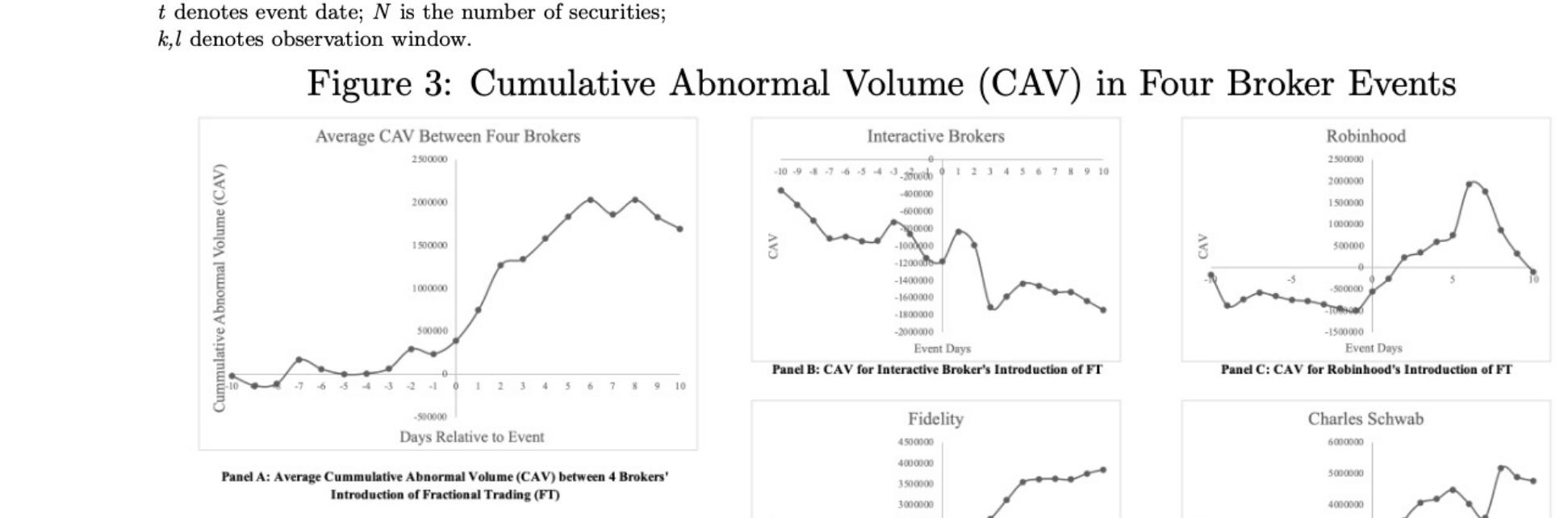
$$(12) AV_t = \frac{1}{N} (AV_{it})$$

$$(13) CAV_{k,t} = \sum_{l=k}^t AV_{it}$$

t statistics in parentheses. * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01

where *i* denotes an individual stock; *k* is the average 20-day volume; *t* denotes event date; *N* is the number of securities; *k, l* denotes observation window.

Figure 3: Cumulative Abnormal Volume (CAV) in Four Broker Events



4. Liquidity

A stocks' liquidity tells us how easily a it can be traded between investors. We used the reciprocal of Amihud's Illiquidity measure to determine stocks' liquidity and find that it significantly increased when brokers immediately execute their orders.

Empirically,

$$(14) H_0 : LiquidityRatio = 1$$

$$(15) H_A : LiquidityRatio \neq 1$$

$$(16) ILLIQ = \frac{1}{D_t} \sum_{t=1}^{D_t} \frac{|r_{it}|}{V_{it}}$$

$$(17) LIQ = \frac{1}{D_t} \sum_{t=1}^{D_t} \frac{V_{it}}{|r_{it}|}$$

where *i* denotes a single security; *t* is event date; *D* denotes the number of days in observation; *V* is dollar volume.

$$(18) LiquidityRatio = \frac{LIQ_{preFT}}{LIQ_{postFT}}$$

5. Robinhood-Specific Analyses

Using the number of users holding a stock, we show that high-priced stock ownership significantly increased after fractional trading was introduced. Further, we provide evidence that Robinhood investors are largely contrarian (i.e. taking opposite positions) which facilitates stock trades to happen, thereby increasing its liquidity.

Figure 4: High-priced stock Ownership Breeds in Robinhood

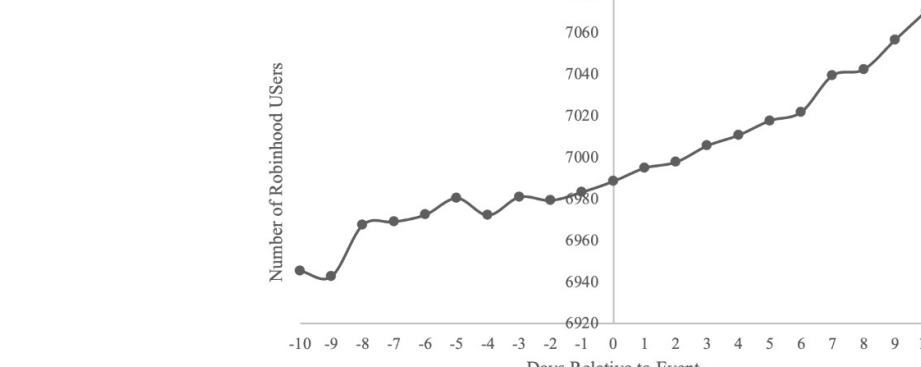
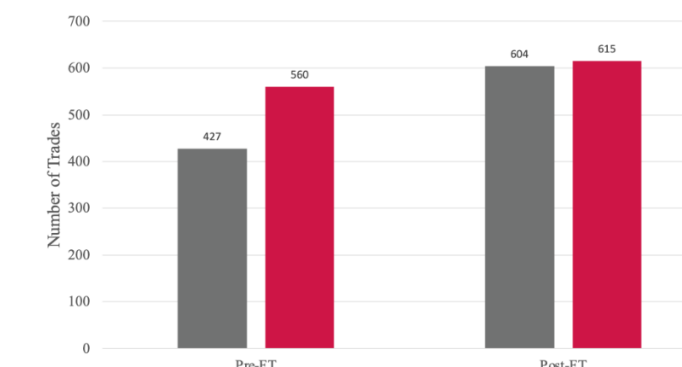


Figure 5: Number of Momentum and Contrarian Trades in Robinhood



DISCUSSION

A significant increase in trading volume but insignificant price change suggests a net effect between buys and sells— that fractional trading (FT) encouraged more retail trading activity that isn't directional.

We posit that the insignificance in price changes may be due to Robinhood's incremental rollout of FT leading to a gradual price changes, a poor news dissemination of FT's introduction, and a low level of interest on FT and investing in general.

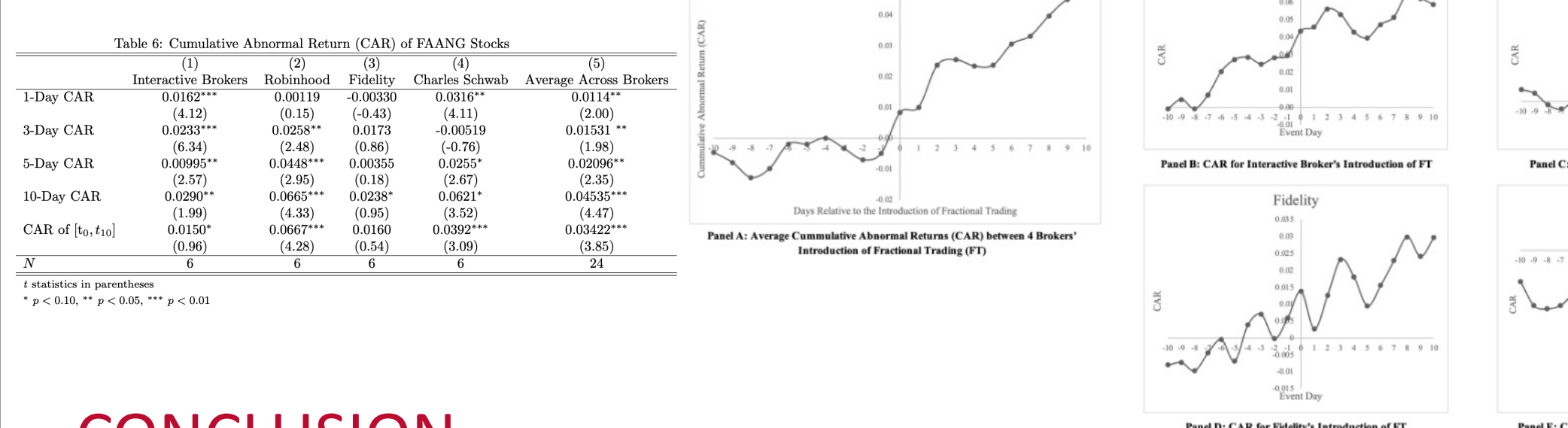
In the end, brokers achieved their end goal of introducing FT to encourage trading activity— that the demand of high-priced stocks increased due to its newfound affordability. Our analyses on volume, volatility, liquidity, and ownership breadth confirmed this notion.

Many stocks in our high-priced subset might be foreign to the average investor. Therefore, we conducted an event study to determine FT's introduction in retail-favored stocks: FAANG (Facebook, Amazon, Apple, Netflix, and Google). We find evidence of an increase in CAR ranging from 1.5% to 6.7% after FT was introduced.

Anecdotal Evidence on Popular High-Priced Stocks

Therefore, we conducted an event study to determine FT's introduction in retail-favored stocks: FAANG (Facebook, Amazon, Apple, Netflix, and Google). We find evidence of an increase in CAR ranging from 1.5% to 6.7% after FT was introduced.

Cumulative Abnormal Return (CAR) of FAANG Stocks



CONCLUSION

We provide weak evidence for the increasing demand for high-priced stocks in the advent of fractional trading (FT); even more so when the stocks are popular amongst retail investors. Our study shows that a stock's nominal price plays a significant role in investors' investment decisions, thus providing additional evidence towards the marketability hypothesis.

FURTHER STUDIES

The advent of fractional trading invited more irrational actors into the stock market. Our study showed that retail investors make investment decisions based on stocks' nominal prices which are unrelated to firms' fundamentals. This is evidence against market efficiency because the EMH claims that investors should make trading decisions based on fundamental information with traditional utility maximizing motives.

We hope that this study provides motivating evidence to further investigate the implications of market efficiency as we see an increasing number of retail investors in the stock market.

BIBLIOGRAPHY

[1] Amihud, Yakov. "Illiquidity and Stock Returns: Cross-Section and Time-Series Effects." *Journal of Financial Markets* 5.1 (2002): 31-56.
 [2] Baker, Malcolm, Robin Greenwood, and Jeffrey Wurgler. "Catering Through Nominal Share Prices." *The Journal of Finance* 64.6 (2009): 2259-2590.
 [3] Bartlett, Robert P., Justin McCrary, and Maureen O'Hara. "A Fractional Solution to a Stock Market Mystery." Available at SSRN (2022).
 [4] Birru, Justin, and Baolian Wang. "The Nominal Price Premium." *Fisher College of Business Working Paper* 2015-03 (2015): 15.
 [5] Birru, Justin, and Baolian Wang. "Nominal Price Illusion." *Journal of Financial Economics* 119.3 (2016): 578-598.
 [6] Da, Zhi, Vivian Fang, and Wenwei Lin. "Fractional Trading." Available at SSRN 3949697 (2021).
 [7] D'Onofrio, Anne Haubo, Andriy Shkillo, and Ingrid M. Werner. "The Retail Execution Quality Landscape." *Fisher College of Business Working Paper* 2022-03 (2022): 914.
 [8] Fama, Eugene F., et al. "The Adjustment of Stock Prices to New Information." *International Economic Review* 10.1 (1969): 1-21.
 [9] Foucault, Thierry, David Sraer, and David J. Thesmar. "Individual Investors and Volatility." *The Journal of Finance* 66.4 (2011): 1369-1406.
 [10] Kaniel, Ron, Gideon Saar, and Sheridan Titman. "Individual Investor Trading and Stock Returns." *The Journal of Finance* 61.1 (2008): 273-310.
 [11] Weld, William C. et al. "The Nominal Share Price Puzzle." *Journal of Economic Perspectives* 23.2 (2009): 121-142.