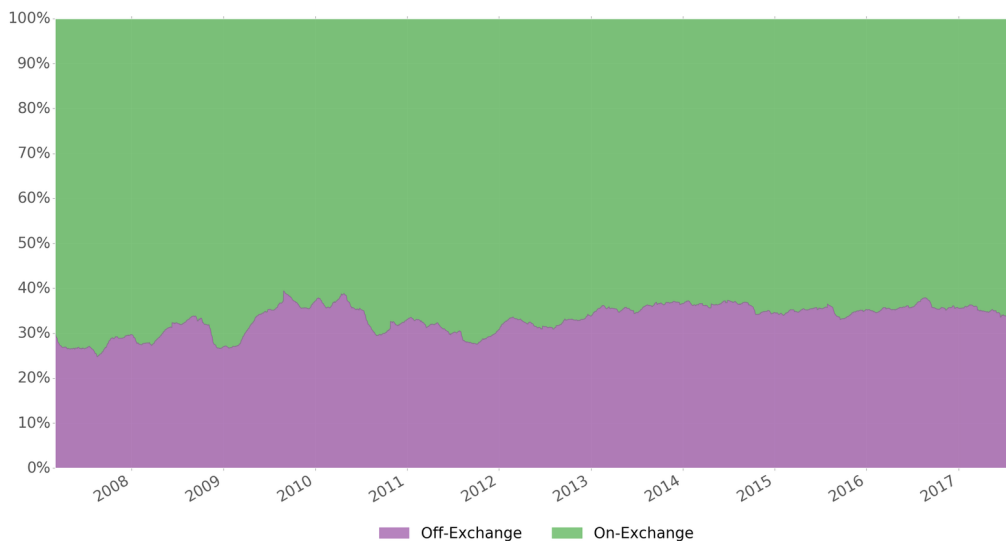


The State of the U.S. Equity Markets

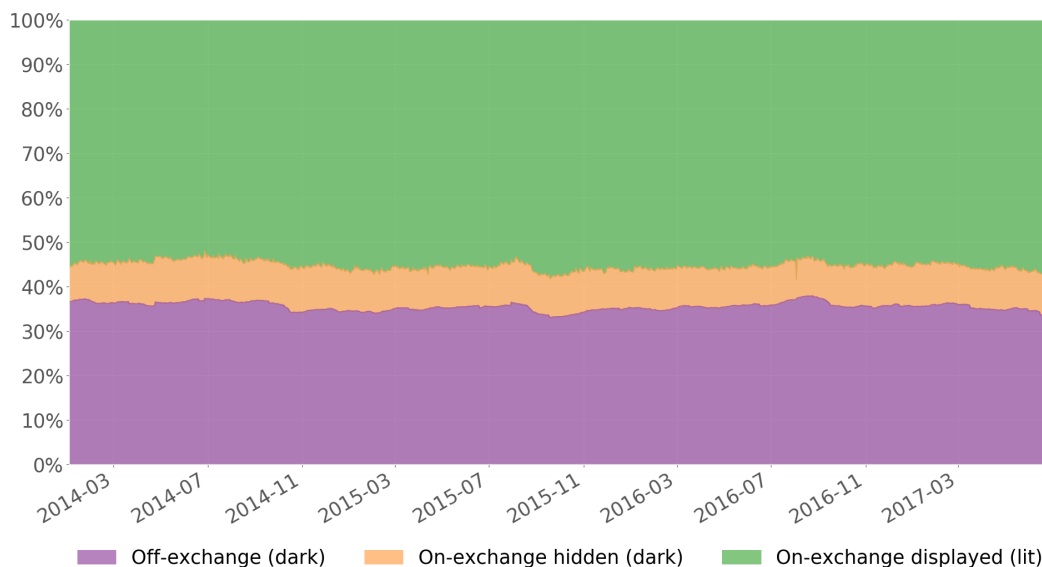
September 2017

Figure 1: Share of Trading Volume –Exchange vs. Off-Exchange¹



Approximately 70% of U.S. trading volume takes place on U.S. stock exchanges. As Figure 1 shows, this has been flat since 2007 when comprehensive data first became available.

Figure 2: Share of Trading Volume – Dark Trading vs. Lit Trading²

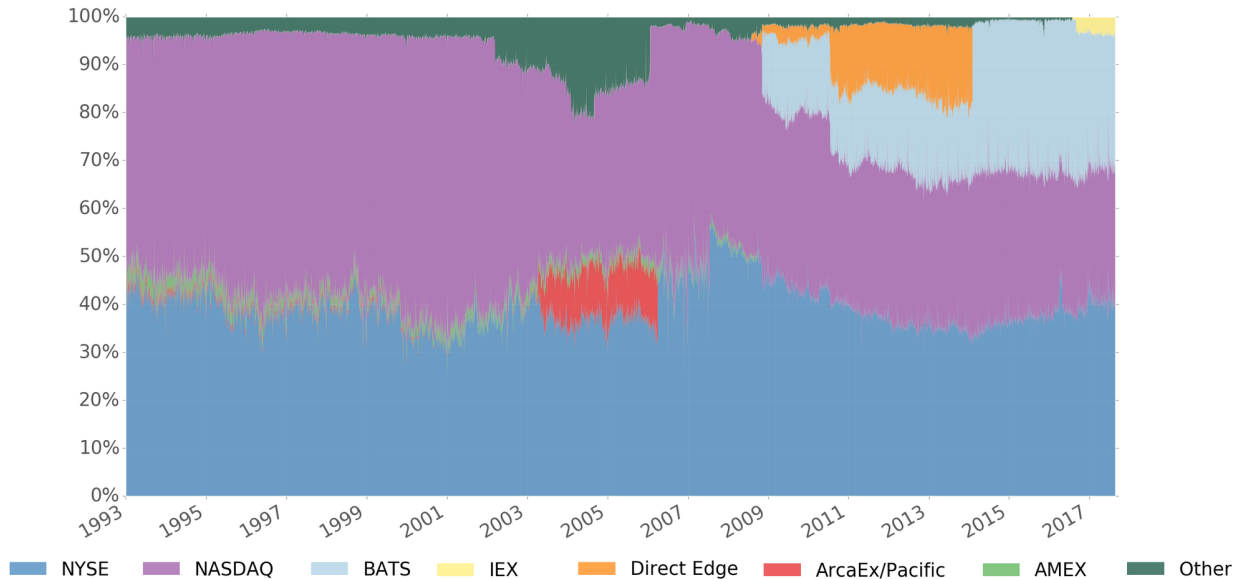


Approximately 45% of U.S. trading volume takes place in the “dark.” As Figure 2 shows, this has been flat since 2014 when comprehensive “dark” trading data became available.

¹ Trade and Quote (“TAQ”) database. 10-day moving average. TAQ coding of off-exchange data began in March 2007.

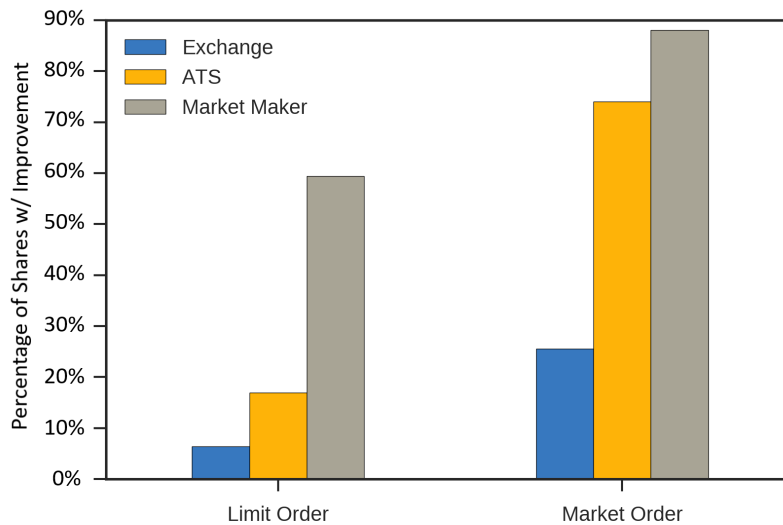
² TAQ database and SEC MIDAS database. 10-day moving average. Comprehensive hidden exchange data is available in the SEC Midas database beginning in 2014 (NYSE and NYSE Mkt data are not available prior to 2014).

Figure 3: Share of Exchange Volume by Exchange Group³



BATS, Nasdaq and NYSE execute over 95% of all trades on U.S. stock exchanges.

Figure 4: Frequency of Price Improvement by Venue Type⁴

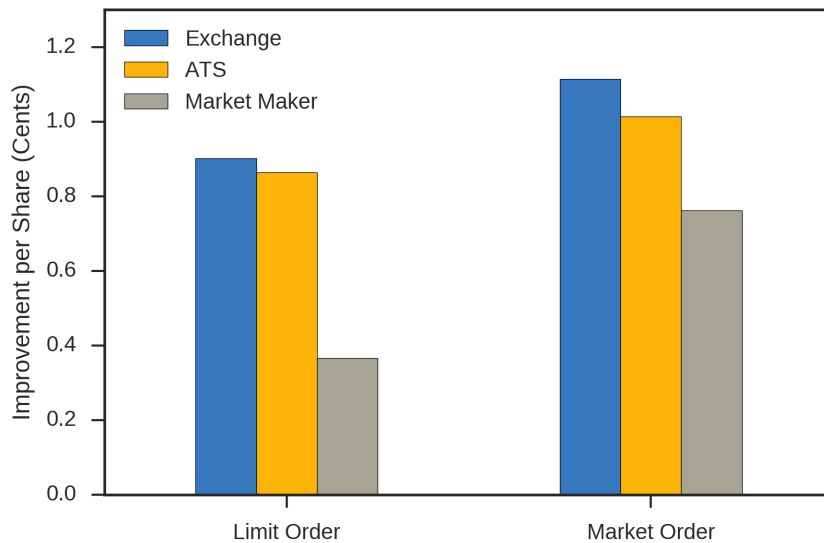


As shown by Figure 4, OTC market makers (broker-dealer internalizers) provide price improvement to the best available price for a stock more often than Exchanges and ATSS.

³ TAQ database. Daily aggregate trading volume by venue code. This figure excludes OTC/off-exchange volume.

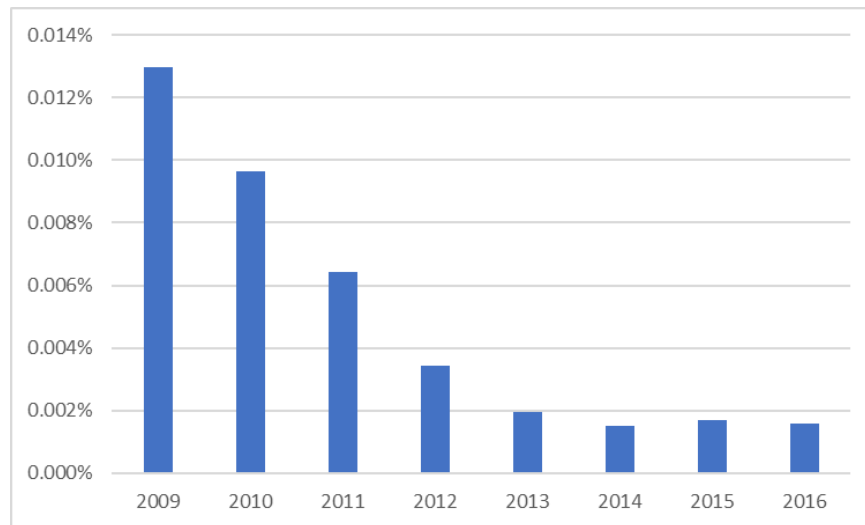
⁴ Rule 605 filings for March, April, and May 2017. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSS for transactions in Reg NMS stocks (UBS ATS, Crossfinder, JPM-X, Level ATS, and Barclays LX ATS). We note that regulations only permit Exchanges and ATSS to offer mid-point price improvement while OTC market makers may offer price improvement at any increment.

Figure 5: Magnitude of Price Improvement by Venue Type⁵



As shown by Figure 5, Exchanges provide the most significant price improvement to the best available price, as compared to ATSS and OTC market makers (broker-dealer internalizers).

Figure 6: HFT Revenue as % of Total Dollar Volume in U.S. Equity Trading⁶

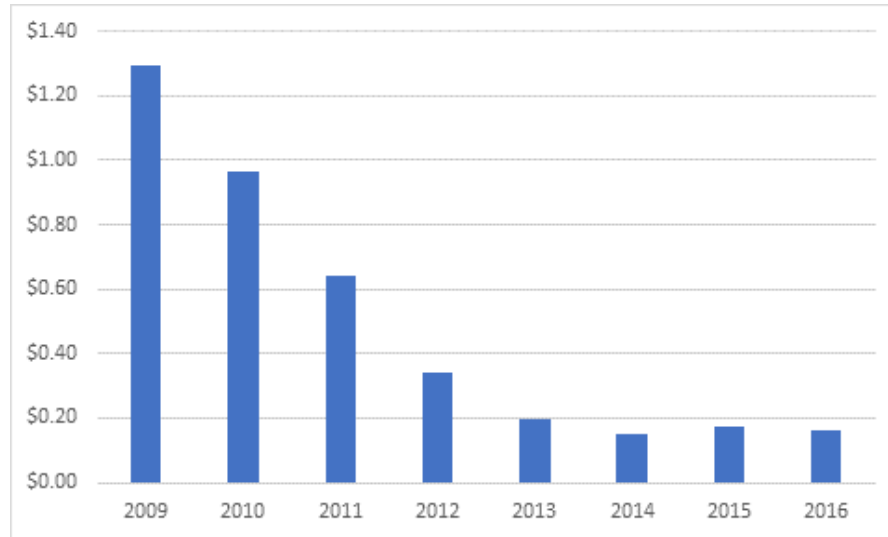


⁵ Rule 605 filings for March, April, and May 2017. Market maker data gathered for top 9 venues for non-ATS OTC transactions in Reg NMS stocks (Citadel Securities LLC, KCG Americas LLC, G1 Execution Services LLC, Goldman Sachs & Co, UBS Securities LLC, Two Sigma Securities LLC, Deutsche Bank Securities, Morgan Stanley & Co LLC, and Citigroup Global Markets Inc.). ATS data gathered for 5 of the top 10 ATSS for transactions in Reg NMS stocks (UBS ATS, Crossfinder, JPM-X, Level ATS, and Barclays LX ATS). We note that regulations only permit Exchanges and ATSS to offer mid-point price improvement while OTC market makers may offer price improvement at any increment.

⁶ TABB estimate as to HFT revenues and Bats Global Markets trading volume data. Calculated by dividing total annual revenue for high frequency trading firms from U.S. stocks by the total annual dollar volume of equity trading in the U.S.

Although it is generally understood that HFT strategies accounts for 50% of all trading in the U.S. stock market, Figure 6 shows that HFT revenue is miniscule (.002%) when compared to total dollar trading volumes in U.S. markets.

Figure 7: HFT Revenue per \$10,000 of U.S. Equity Trades⁷



For example, Figure 7 shows that HFT firms earn less than 20 cents in revenues for every \$10,000 of U.S. equity trades.

⁷ TABB estimate as to HFT revenues and Bats Global Markets trading volume data. Calculated by multiplying the percentages in Figure 10 by 10,000.

Equity Market Characteristics: Quotes, Trading, Volatility and Liquidity

Figure 8: Median Intraday Quotes per Trade⁸

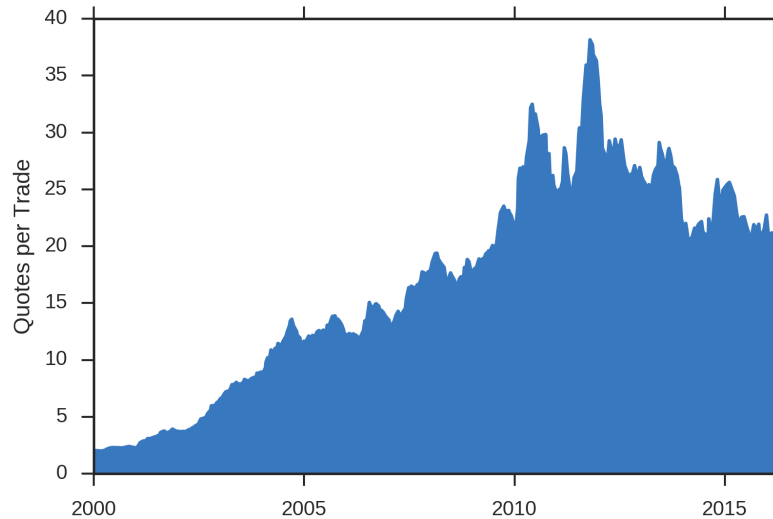


Figure 8 shows that there are approximately 20 quotes per executed trade in U.S. stocks. This is down from historical highs from 2010-2012.

Figure 9: Total Daily Trading Volume in NMS Securities⁹

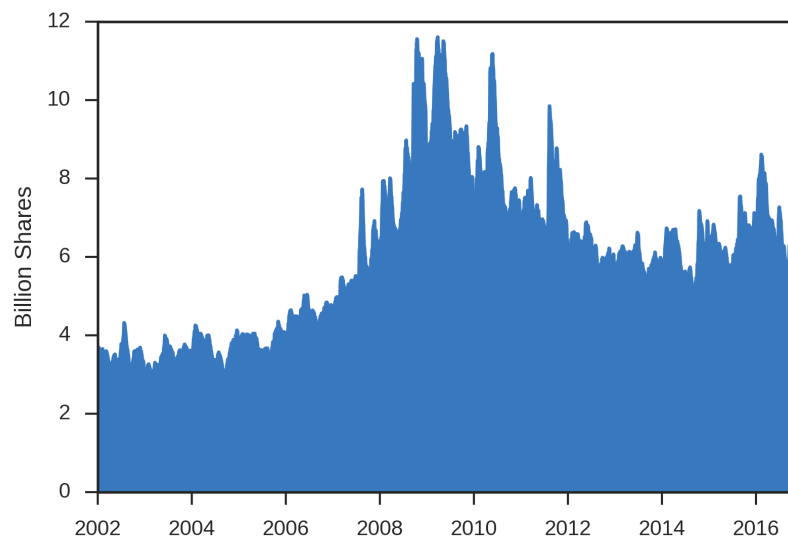


Figure 9 demonstrates that 7 billion shares trade daily in U.S. equities markets. This is down from historical highs from 2008-2012.

⁸ TAQ database. Data reflects a 2-day moving average for smoothness.

⁹ TAQ database. Data reflects a 10-day moving average for smoothness.

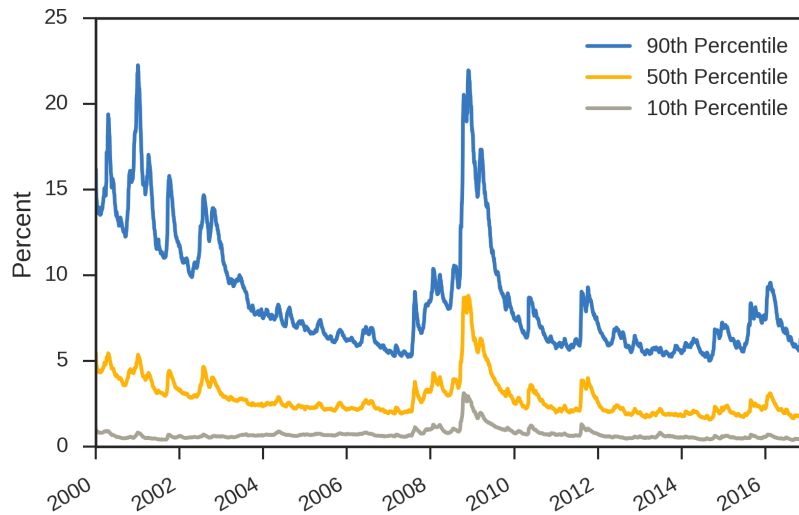
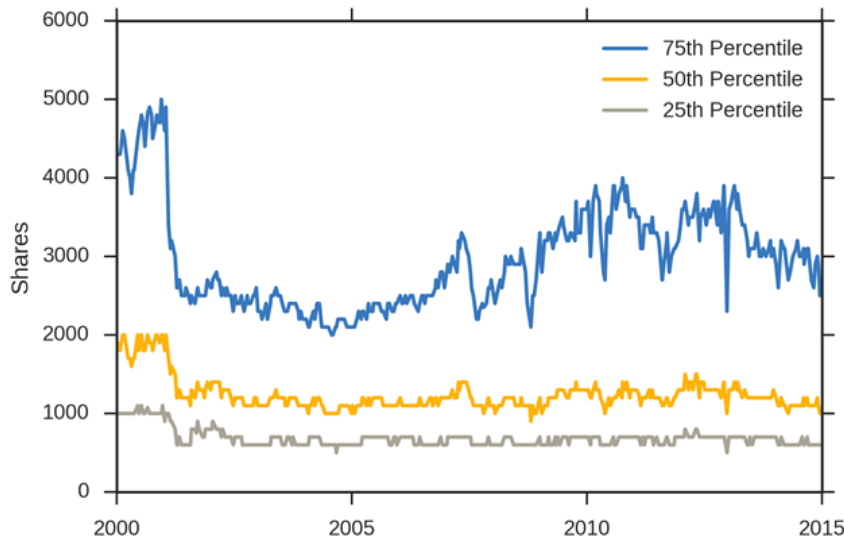
Figure 10: Intraday Volatility¹⁰

Figure 10 shows that intraday volatility is below historical averages. For example, the most volatile stocks (90th percentile in volatility) fluctuate in value by less than 10% in a day.

Figure 11: Volume Depth Available at NBBO¹¹

The liquidity of U.S. stocks remains consistent with historical averages. For example, Figure 11 shows that for stocks with lower than average liquidity (25th percentile) there are 1000 shares publicly available to trade.

¹⁰ CRSP database. Intraday volatility is defined as (daily high minus daily low) / daily low. Data reflects a 10-day moving average for smoothness.

¹¹ TAQ database.