Time Series Market Share

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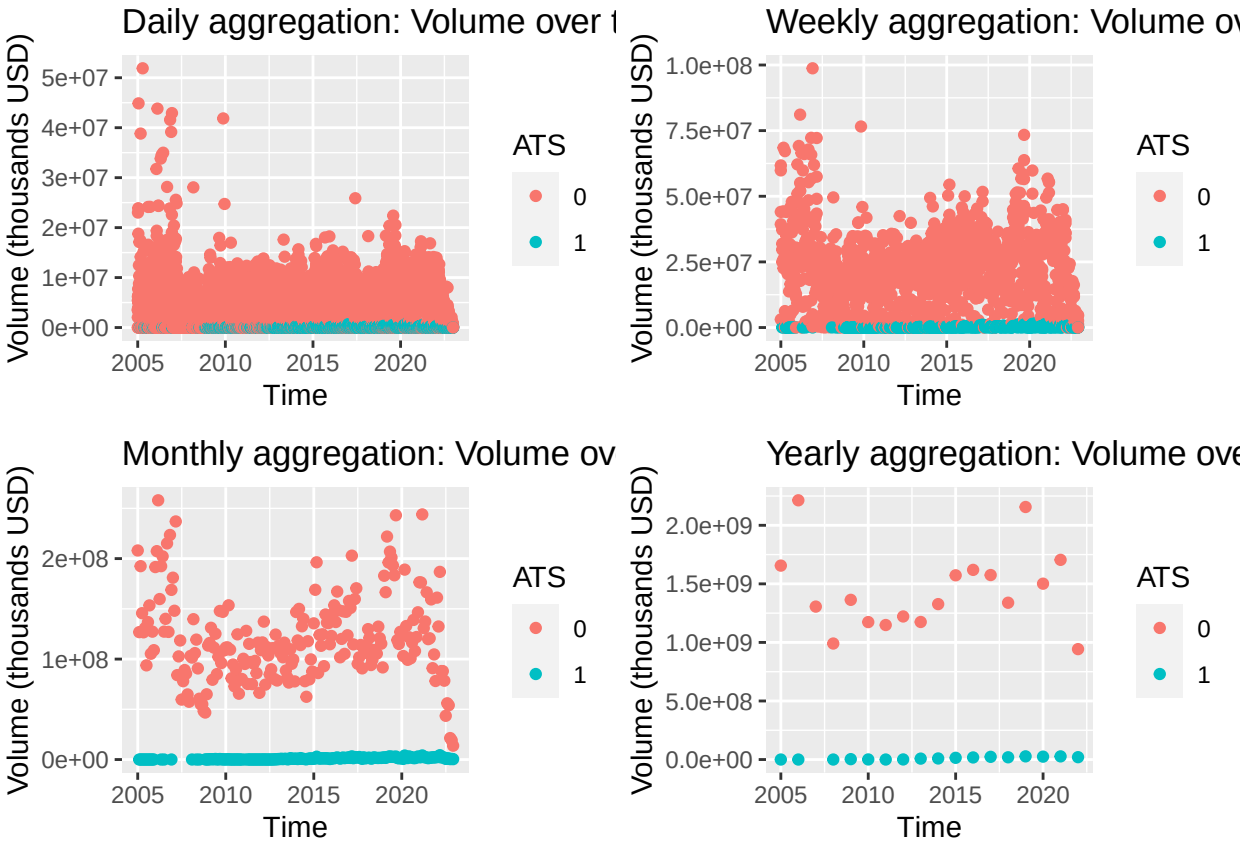
Market Share of E-Traders over Time

We import the data from Dropbox and remove all negatives values of trade_cost

```
#Basic filtering conducted on the read-in data
df <- df[df$trade_cost > 0, ]
```

NOTE: README Document notes that some trade_cost obs are in plain dollar amount rather than thousands, there has not yet been any action taken regarding this information.

In our plotting, we plot on four scales: daily, weekly, monthly, and yearly, across four measures of market share: OTC volume, e-trading volume, combined (both volumes on one graph), and proportionally (e-trading volume / OTC volume). The report quality of the graphics is rather low in detail, please find the full versions of the graphs attached.



```
## `geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
## `geom_smooth()` using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
## `geom_smooth()` using method = 'loess' and formula = 'y ~ x'
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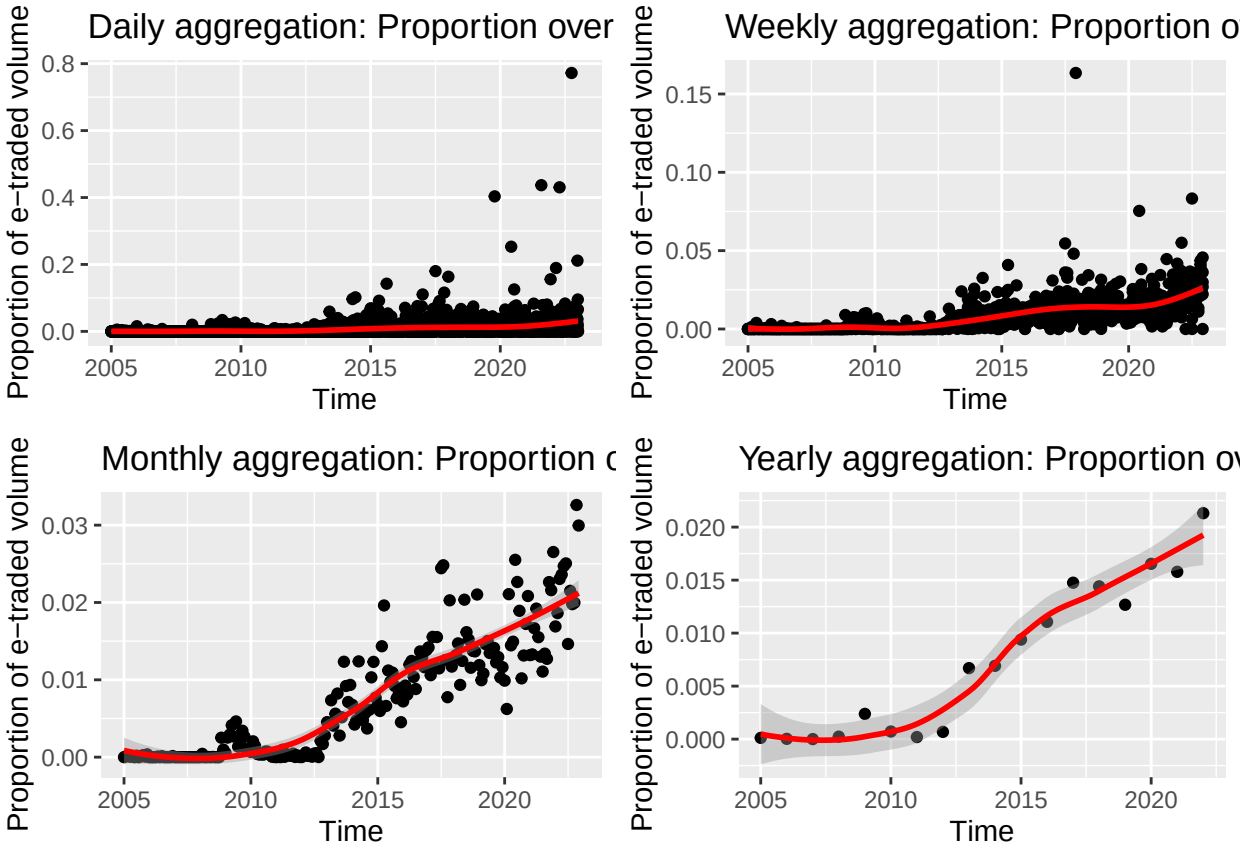


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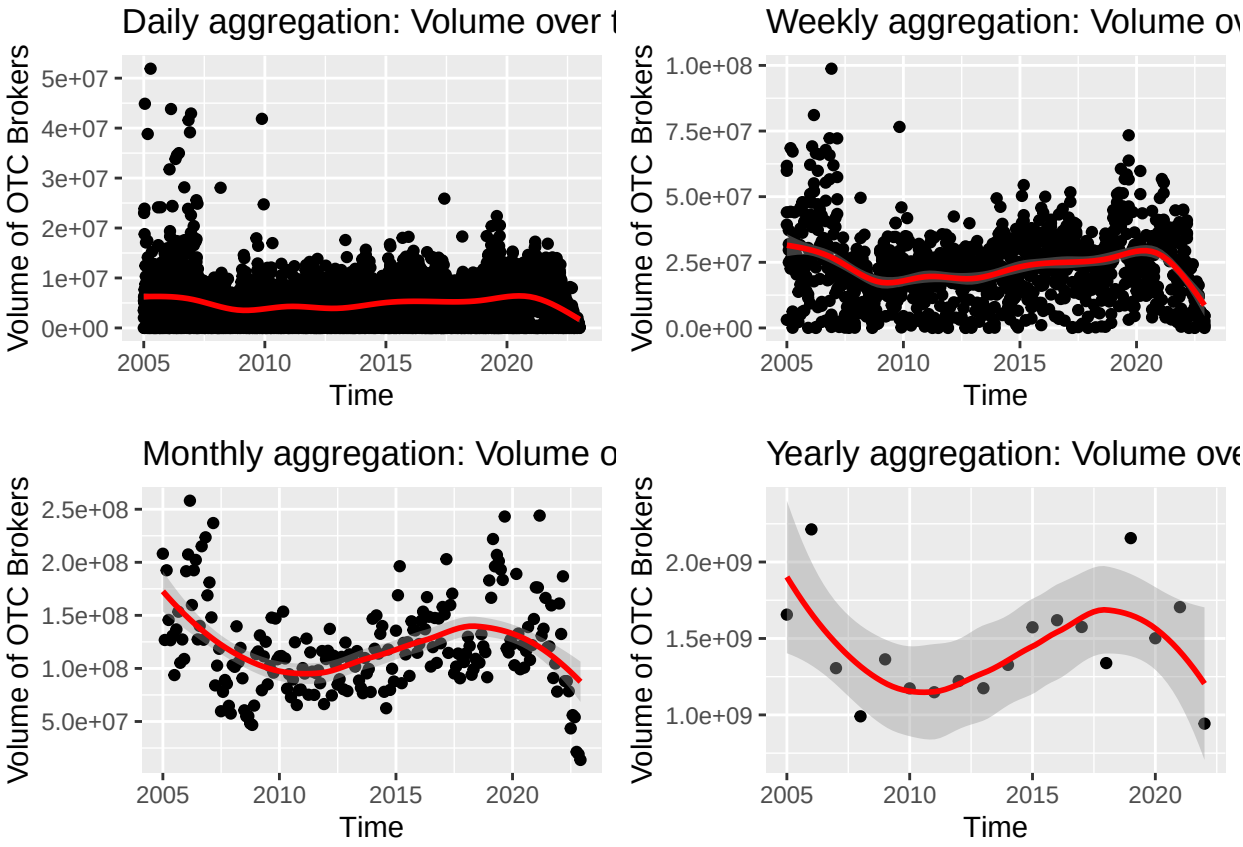


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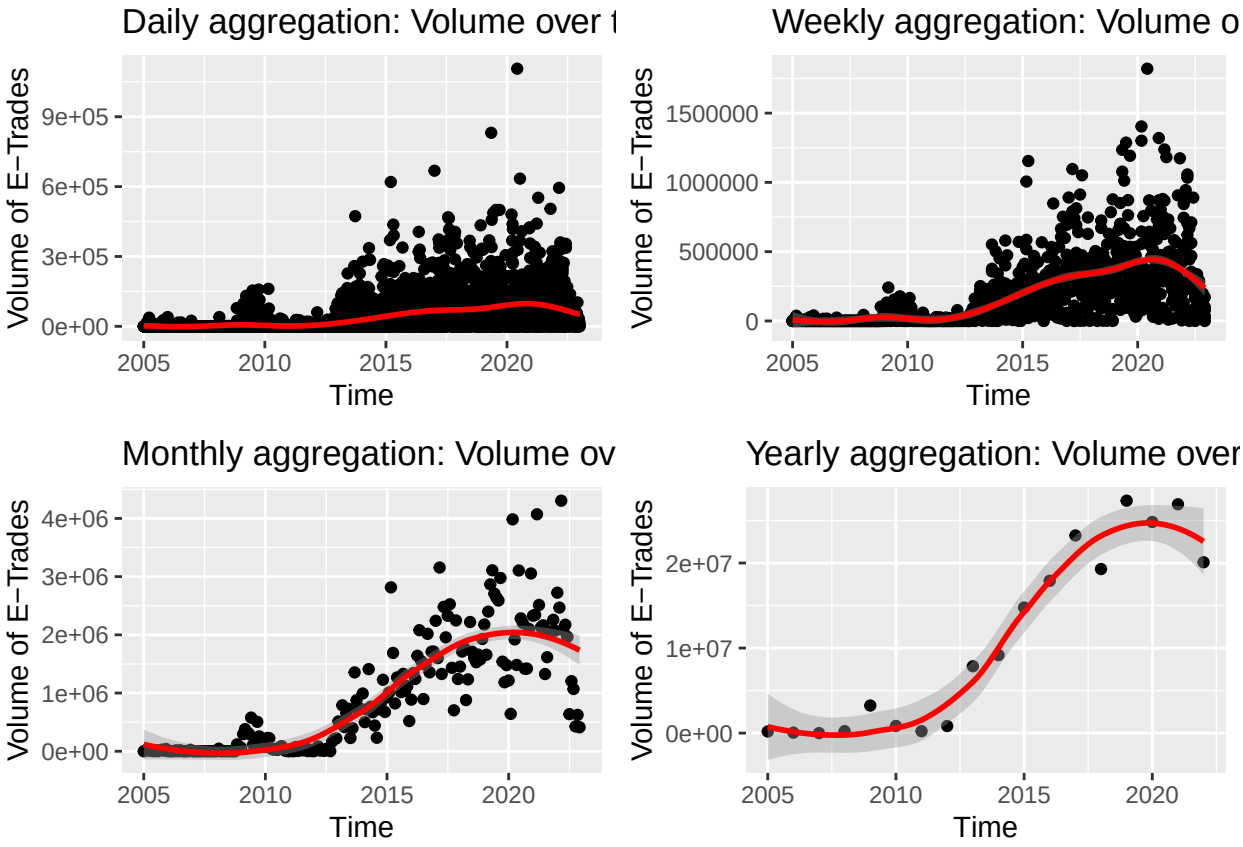

From these graphs, we can notably have a few takeaways:

1. The proportion of e-trades as total volume has definitely increased over time. The trend is strong at 3 levels of aggregation. Note in the monthly aggregation we see a jump e-traded volume around 2008 - 2010. Potentially this could be due to a loss in confidence of traditional OTC brokers during the financial crisis?

2. In the double plot, we see that traditional OTC brokerage deals still heavily outweigh e-trades despite this increase in proportion. However, this graphic may be a little misleading because it portrays the e-trades as having close to no volume where in reality it is only around one magnitude (10^-1) less than OTC volumes. However, it is apparent that there has been a decline in volume for OTC trades since around 2007. Given that e-trading volume has not increasing proportionally, this decline is likely attributable to more macro factors.

3. Graphs for OTC and e-trading volumes separately support that e-trading is gaining more prominence. However, one notable observation is the upwards trend in OTC volume in the late 2010s.

Ultimately, the graph of e-trading volume by itself stands as the best empirical measure of the increased prominence of e-trading. However, it does not seem like this increase in prominence has come at the expense of traditional OTC brokers, as the decrease in OTC volume is not matched. Changes is volume also suffer from confounding macroeconomic variables which are not captured by these visualizations. Further analysis on a company-level may yield more insight as to whether companies are switching over to e-trading, or if it remains a trend for certain companies and not others.

One major caveat to this analysis I would add is that many trade_price values may be in dollars instead of thousands of dollars. Depending on the severity of this issue, the data and visualizations may drastically change.