# UNIVERSITY OF AMSTERDAM

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## Topics in market microstructure

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# Chapter 6

# Conclusions

Unifying ideas behind the four chapters comprising this thesis are both market microstructure and an agent based view of trading in financial markets.

In the first chapter we have shown that there exist some properties of aggregate trader behavior that follow simple statistical regularities. The fact that one can describe the unconditional behaviour in limit order price placement of many rational agents as a simple statistical law is quite interesting. One could argue that the unconditional distribution of limit order prices for a single trader can be described by a distribution whose properties depend on the characteristics of the trader (size, trading horizon, strategy, risk preferences, etc.) However, it is not apriori clear why should a mixture distribution of all traders' limit prices converge to a stable fat-tailed distribution.

We also scratched the surface of possible conditional dependencies by showing the relationship between volatility and limit order price placement. We propose the possibility that the feedback between the limit order prices and the transaction prices contribute to the effect of clustered volatility.

In the second chapter we use the zero-intelligence paradigm to investigate the extent to which market design influences the outcome of the trading proces. We *assumed* that the empirical orderflow was coming from a zero-intelligent trader and was describable as three unconditional statistical processes which are independent from each other: market order placement (rate; number of market orders per unit time), limit order placement (rate and price; number of limit orders per unit time and per unit price) and cancellation (rate; number of orders canceled per unit time). We then estimated the parameters of these proceses from market data. Using simple dimensional anal-

ysis from Daniels et al. (2003) we predict the value of the spread, volatility and market impact from the estimated process parameters. Interestingly the predicted values were very close to the empirical values observed cross-sectionally over 11 stocks investigated. This led us to speculate that some market variables are more influenced by the constraints imposed on trading actions and market design, then by the strategic interaction of traders. In fact, the virtue of the zero-intelligence model is that it can be used as a benchmark against which one can analyse strategic interaction of traders.

In chapter three, we analysed a possible signature of strategic interaction of agents by looking at the correlations in the buying and selling periods between member firms. The trading of each firm was divided in hourly periods and assigned a +1 for each hour interval the firm was a net buyer, and a -1 for each hour interval when the firm was a net seller. Even with this very simple characterisation of a firm's strategy, we see interesting patterns between firms. The correlation matrix of firm's strategies is not random and is persistent in time. Firms which are correlated in one month tend to be correlated in the next one. We found that the clustering brought by the correlations in strategies separates the firms in a buying and a selling group. The number of firms in the two groups are typically very uneven, with one group being much larger than the other. Furthermore, in spite of the fact that sometimes the small group is the buying group and sometimes the selling group, we found that some firms are more often than at random classified in the smaller group.

In the final chapter, we are turning to the investigation of agent heterogeneity and its influence on the market. We contribute to the literature on return-volume relation by analysing the influence of member firm order sizes[1] on the price process. We find that, in addition to the signed orderflow, the composition of the order sizes on the bid and ask sides of the market determines the price return. Larger heterogeneity of firms (e.g., large fraction of the total volume concentrated in one order) on the bid side, all other things kept equal, has a positive price impact, and vice-versa for the ask side. Said differently, large orders when transacted with multiple small orders adversely move the price. In contrast we also find that large orders when transacted with large orders, do not move the price. This seems to be at odds with the interpretation of informed vs. uninformed trades, and we propose that it may be more likely it is the lack of liquidity associated with small orders that moves the price.

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[1]Firm order size is the number of Pounds a firm trades during a day or hour, depending on the aggregation scale.