

**Price discreteness and clustering in ultra high frequency
equity and options data**

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Dedication

This work is dedicated to my parents, George and Panagiota, and my brother, John.

Αθιερωμένο στους γονείς μου, Γιώργο και Παναγιώτα, και στον αδελφό μου, Γιάννη.

Declaration

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated.

Where correction services have been used the extent and nature of the correction (s) is clearly marked in a footnote (s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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Abstract

There is only sparse evidence on the implications of price discreteness in empirical studies using high frequency data. This thesis deals with the issue of discreteness in irregularly spaced data, and its theme is the investigation of two important aspects of discreteness. In particular, the compass rose pattern and price clustering in the individual equity options market are primarily studied. Also, price clustering is covered in the Initial Public Offerings (IPOs) primary market and its evolution in the secondary market is documented.

The first contribution of the thesis is the design of a new method for data cleaning in options contracts. The data filtering technique adheres to the market structure of individual equity options. The filter is tested using an options database from the NYSE-Euronext London International Financial Futures & Options Exchange (Euronext-LIFFE).

The first empirical chapter studies the compass rose pattern. The results show that even though the tick/volatility ratio performs very well in most cases, it is not a consistent measure of the pattern's strength. This is the first study that documents the relationship of the compass rose pattern with intraday price reversals. It is found that price reversals resemble a diagonal line which is embedded in the compass rose pattern and can only appear at higher sampling frequencies. A discussion on the determinants of return reversals shows that, in contrast with previous studies, less information is disseminated at the exchange at the market open and market close. Instead, a strong link with the release time of the scheduled macroeconomic announcements is reported.

The second empirical chapter studies price clustering, comparing equity and options markets. Price clustering in the equity market is one-dimensional, thus the price level and the volatility of the prices are the main factors which explain the level of price clustering. In contrast, price clustering in option contracts has embedded time and value elements. Time to maturity is negatively associated with price clustering and also a strong negative association between moneyness and price clustering is found. Finally, it is reported that the Designated Market Maker Scheme at Euronext-LIFFE has little influence on price clustering in individual equity options contracts.

The final empirical chapter is the first study to systematically investigate price clustering in new equity assets at the London Stock Exchange. A high frequency dataset is used to test the hypotheses that past price information and market maker activities are related to price clustering in these assets. Price clustering in IPOs is substantially greater than the clustering observed for non-IPO assets, which validates the hypothesis that the decision of going public is followed by haziness about the true price. Underpricing is a significant determinant of price clustering, which supports the notion that underpriced IPOs partially reflect price uncertainties. Tick size specifications can be restricting for individual investors, while giving execution priority to market makers.

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“Love each man according to his contribution in the struggle. Do not seek friends; seek comrades-in-arms.

Be always restless, unsatisfied, unconforming. Whenever a habit becomes convenient, smash it! The greatest sin of all is satisfaction.” (N. Kazantzakis)

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