UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Università degli Studi di Padova

Master Degree Course in Computational Finance

Regression and Time Series Models

Group Work 1 - Regression with CAPM Model

Created by:

Martina Arrighini, 2149799, martina.arrighini@studenti.unipd.it

Luigi Babiski Arruda, 2031997, luigi.babiskiarruda@studenti.unipd.it

Giorgio Cottini, 2140740, giorgio.cottini@studenti.unipd.it

Enrico Paciaroni, 2139678, enrico.paciaroni@studenti.unipd.it

Commissioned by:

Prof. Massimiliano Caporin

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Assignment 1

Assignment 2

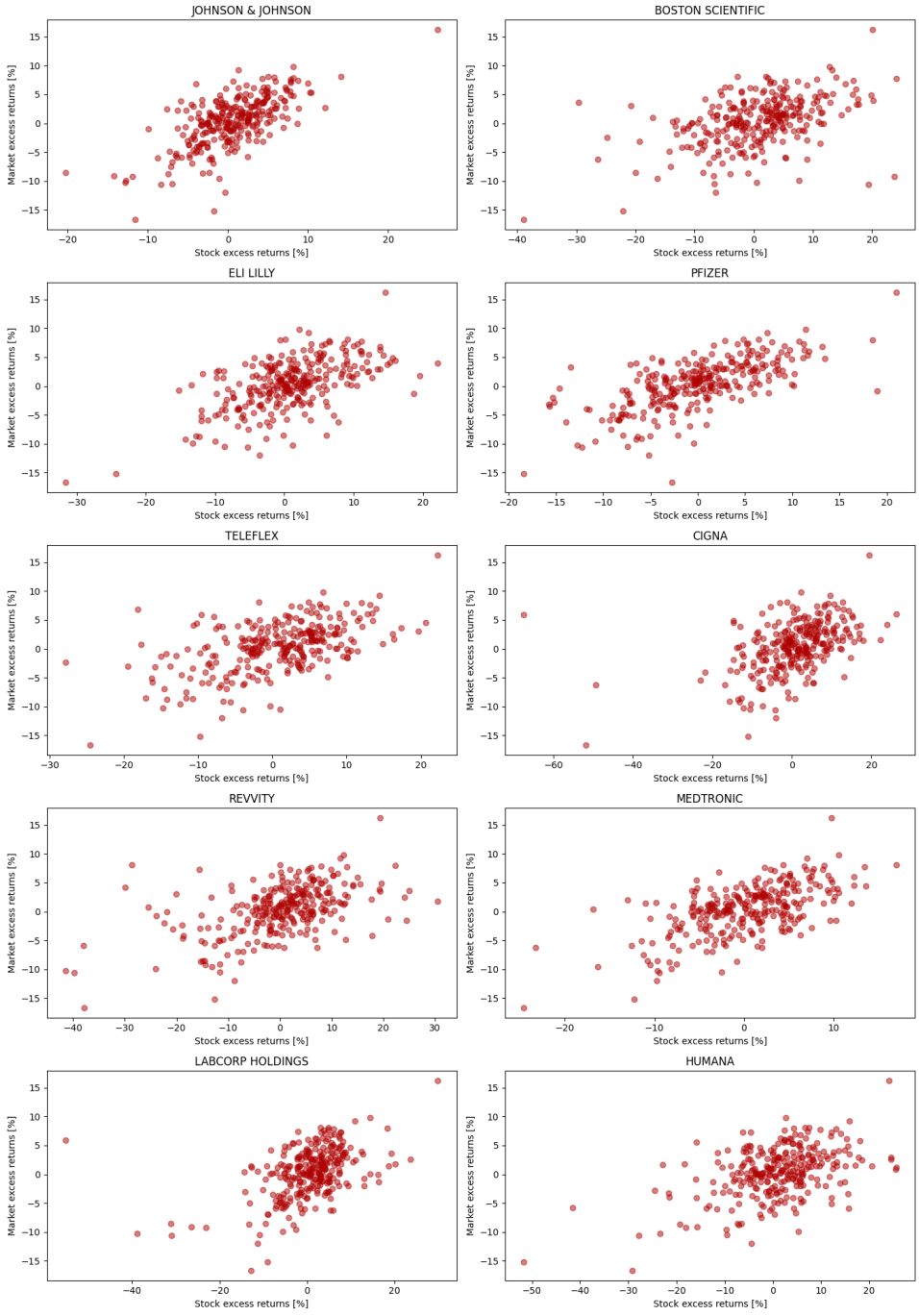

Fig. 1: Scatterplot of equities' log-returns against excess market returns.

Assignment 3

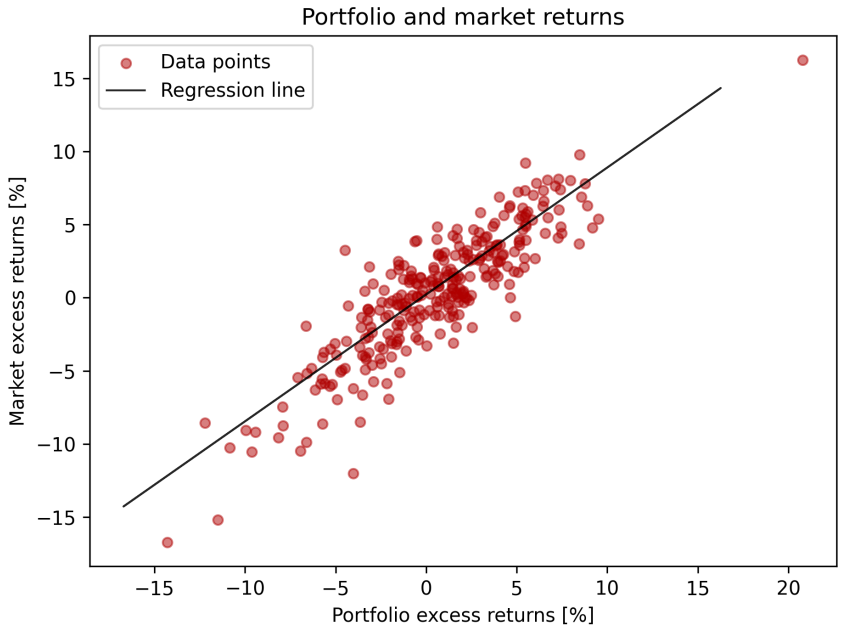

Fig. 2: Scatterplot of portfolio's returns against excess market returns, with linear regression.

Assignment 4

Assignment 5

In this section, we employ the Chow test to assess whether a significant structural change occurs in the regression models at specific points in time. To ensure the robustness of our analysis, we first established a minimum data subset size for the unrestricted models, setting it to 10% of the total dataset, in order to maintain statistical validity while preserving sufficient data for meaningful comparisons. Subsequently, the Chow test was systematically applied to all linear regressions conducted on the selected equities, allowing us to identify potential structural breaks across the dataset, that is, significant changes in the regression parameters caused by external shocks, market-wide events, or company-specific factors. These structural breaks may reflect shifts in the relationship between excess returns and market behaviour, such as changes in systematic risk (β) or the presence of unexplained excess returns (α) due to macroeconomic conditions, regulatory

adjustments or sector-specific developments. To identify these structural breaks, we analyzed the p-values obtained from the Chow test for each equity over time: a p-value below the threshold of 0.01 was interpreted as evidence of a structural break at that particular point in time, signaling that the CAPM parameters had changed significantly. The results of this analysis are presented in Figure 3.

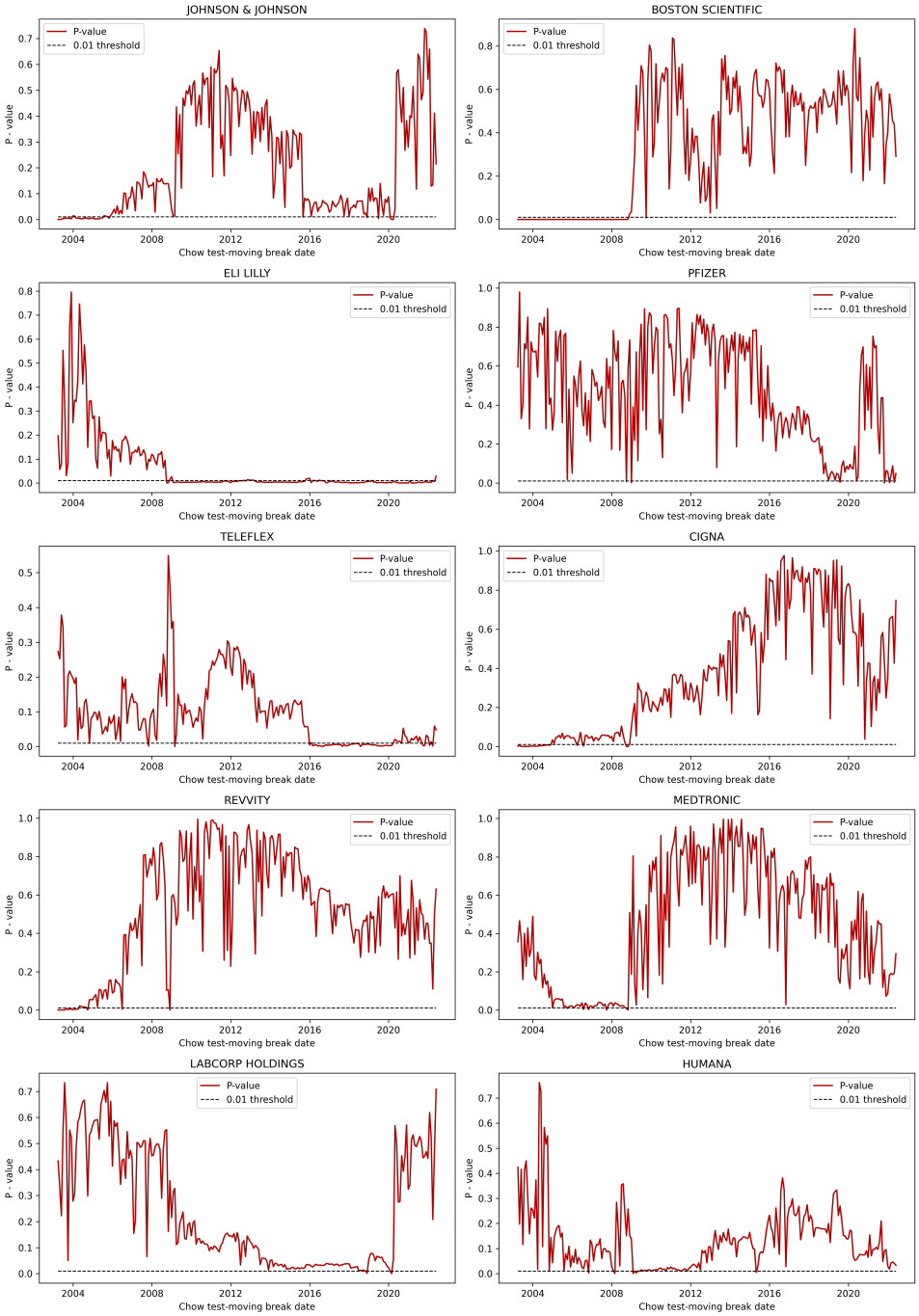

Fig. 3: Chow Test performed for all equities in search of structural breaks.

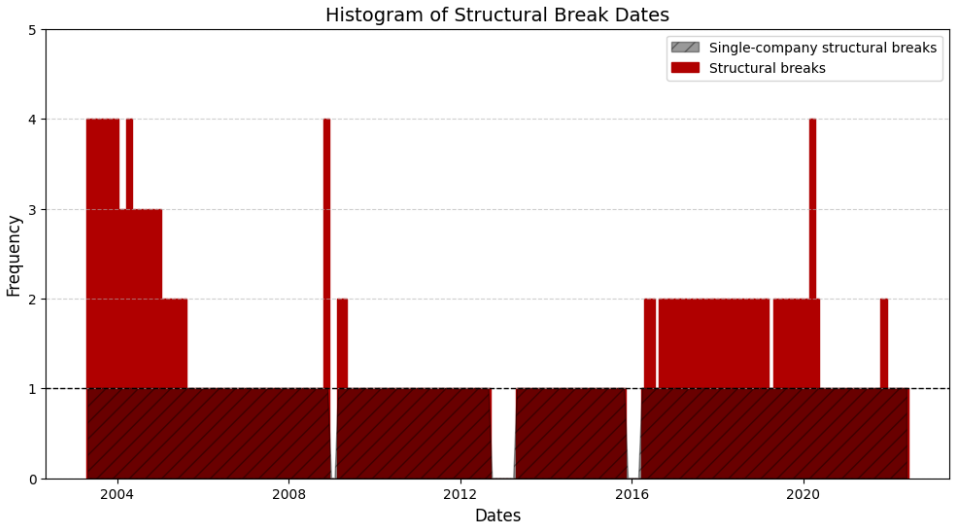

Fig. 4: Frequency of months identified as structural break points.

Assignment 6

Assignment 7

Appendix

Summary of Group Members' Contribution

Martina Arrighini:

Luigi Babiski Arruda:

Giorgio Cottini:

Enrico Paciaroni:

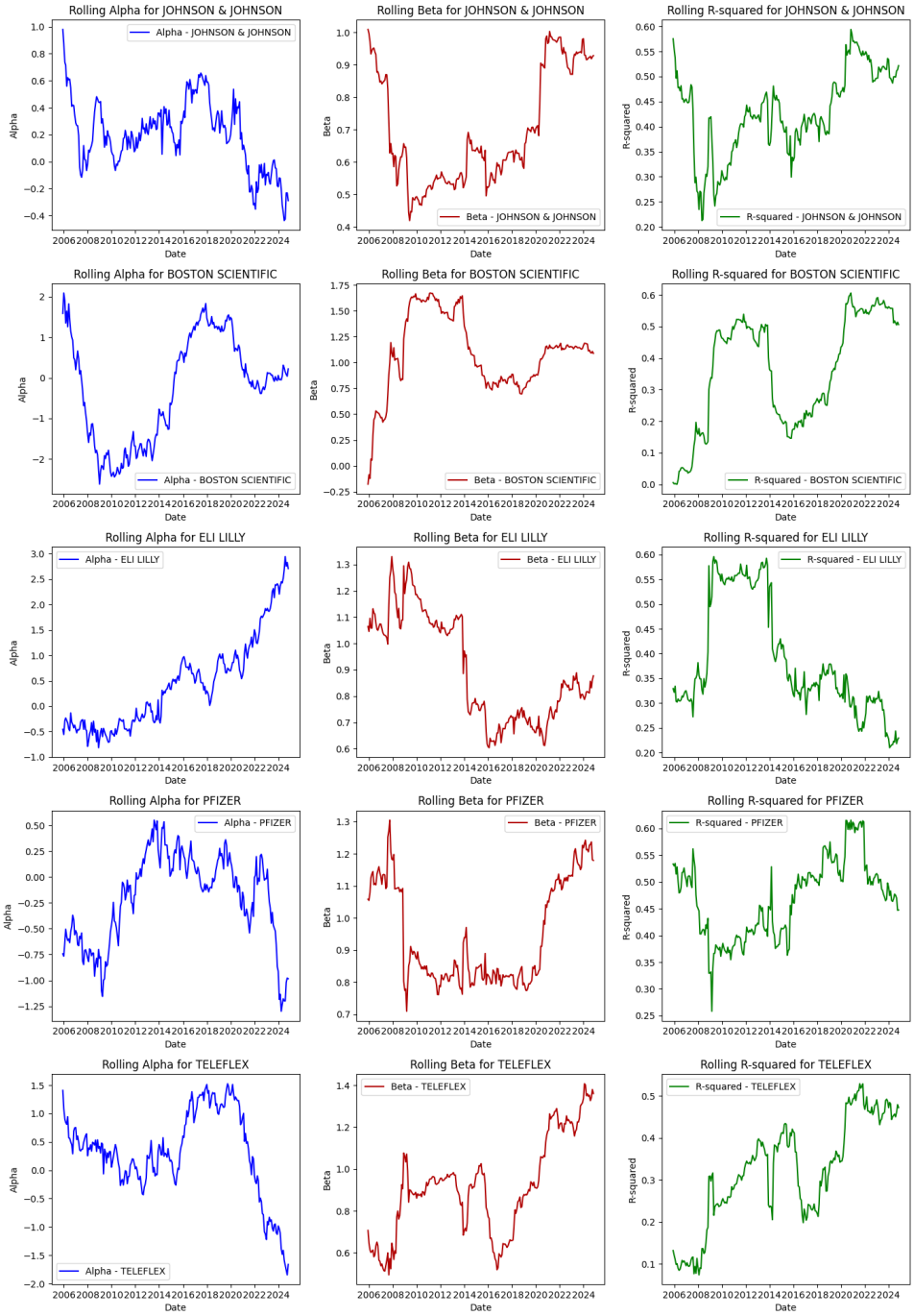

Fig. 5: Rolling quantities computed an all equities as an alternative of the Chow Test in search for structural breaks (1).

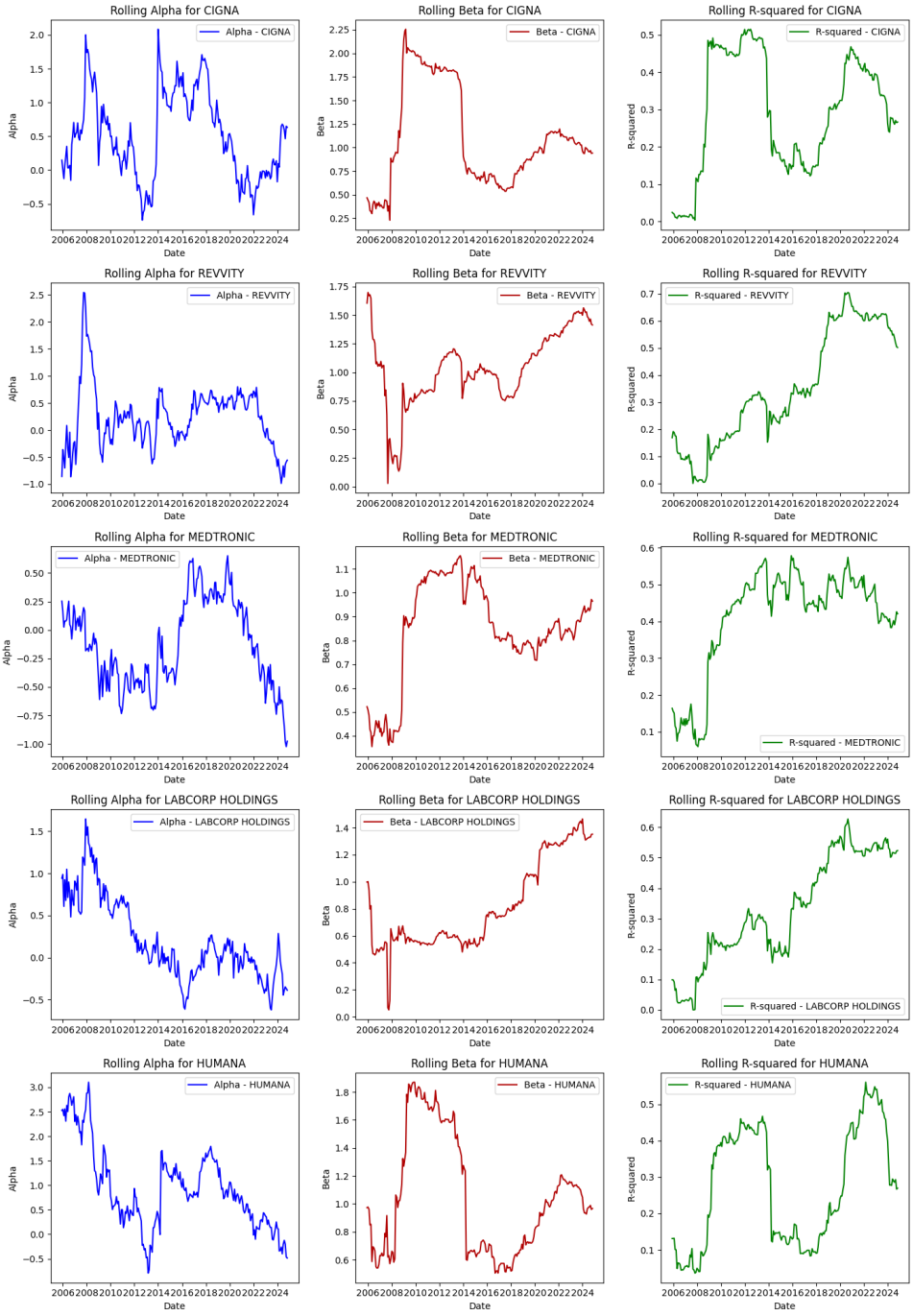

Fig. 6: Rolling quantities computed an all equities as an alternative of the Chow Test in search for structural breaks (2).

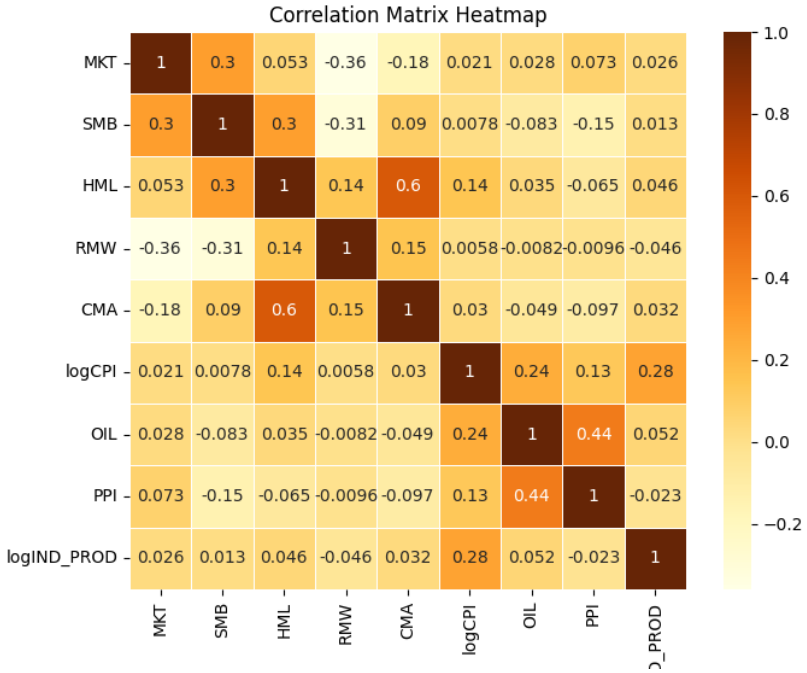

Fig. 7: Heatmap of the correlations between the chosen explainatory variables.