Report on **Bachelor / Master Thesis**

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague

Student:	**Ira Saktor**
Advisor:	**Jozef Baruník**
Title of the thesis:	**Are realized moments useful for stock market returns analysis?**

OVERALL ASSESSMENT *(provided in English, Czech, or Slovak):*

Please provide your assessment of each of the following four categories, summary and suggested questions for the discussion. The minimum length of the report is 300 words.

Contribution
The thesis analyzes use of the realized moments in asset pricing. The analysis is performed with a dataset containing logreturns for 29 of the most traded U.S. stocks and covers years 2005-2015.

The analysis takes a number of related theoretical and empirical papers as a background for the study. Based on the previous work it extends the cross-sectional analysis to the time series framework and studies its properties. Numerous tests are used in a logical framework to evaluate pricing model quality, which allows to better understand the pros and cons of the use of realized moments.

The key contribution is the hard evidence that each of the realized moments – variance, skewness and kurtosis – contribute to the model performance in terms of achievable returns as well as the model's ability to correctly identify the direction of future asset price movements. Specifically, by using realized moments in asset pricing, 60 - 120% higher return could be achived when compared to passively holding stocks over the entire time period.

Additional contribution is a simple extension of the pricing model that accounts for interaction terms between variance and kurtosis, skewness and return, and variance and return. This extension provides additional increase in expected returns of nearly 30% and it also improves predicting accuracy of the sign of future returns.

Methods
In the analysis,a large number of measures (developed in the literature) of the realized moments – variance, skewness and kurtosis – are used. The computed measures of higher moments are then used in the model estimation.

The estimated models fall among three types: (i) models using standard realized moments estimators and their jump-robust versions, (ii) models using skewness and kurtosis estimators proposed by the robust statistics literature, and (iii) restricted and extended models. These models are then tested against a benchmark model – AR1 – as well as against the strategy of passively holding a long position in the entire portfolio of stocks.

The results are evaluated with a set of standard statistical metrics: the root mean squared error, mean absolute deviation, median absolute deviation, Diebold-Mariano test statistic, plus a sign accuracy measure.

Overall, the methodology approach is fine, well motivated and executed. It does not leave open doors and meticulousle explores various evaluation angles.

Literature
The literature review section summarizes the current state of research in the field. It is relatively short but covers literature related to realized volatility and significant amount of current research on higher realized moments. Hence, the literature is reviewed in a detail and covers all relevant papers and angles.

Manuscript form
The manuscript conforms to formal requirements for the master thesis. It reads well but at some places the flow and grammar could be better. The results are presented with a lot of detail – this is good, but the extent is sometime overwhelming, especially in the subsection of the robustness checks.

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Introduction is short but clear and it motivates well the researched topic. Data are fully described. Hypotheses are clearly stated in the thesis proposal but they are not included in the text. Tables and figures are presented in an organized and legible manner. Apendix provides additional information on results and contains also additional graphs. Panels in specific graphs in the Appendix could be presented in the same scale, though. It would provide better comparable perspective. References are complete.

Summary and suggested questions for the discussion during the defense
The thesis represents a solid piece of empirical work on the subject and provides a clear results on how predictions of returns can be improved by useing higher moments..

In case of the successful defense, I recommend the grade A.

SUMMARY OF POINTS AWARDED *(for details, see below):*

CATEGORY		**POINTS**
Contribution	*(max. 30 points)*	29
Methods	*(max. 30 points)*	28
Literature	*(max. 20 points)*	19
Manuscript Form	*(max. 20 points)*	19
TOTAL POINTS	*(max. 100 points)*	**95**
GRADE	**(A – B – C – D – E – F)**	**A**

NAME OF THE REFEREE: Evžen Kočenda

DATE OF EVALUATION: June 5, 2019

Referee Signature