

Advisor's Report on Dissertation Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague
Opletalova 26, 110 00 Praha 1, Czech Republic
Phone: +420 222 112 330, Fax: +420 222 112 304

Author:	PhDr. František Čech
Advisor:	Doc. PhDr. Josef Baruník, Ph.D.
Title of the Thesis:	Three Essays on Risk Modelling and Empirical Asset Pricing
Type of Defense:	DEFENSE
Date of Pre-Defense:	May 23, 2018

Address the following questions in your report, please:

- a) Can you recognize an original contribution of the author?
- b) Is the thesis based on relevant references?
- c) Is the thesis defensible at your home institution or another respected institution where you gave lectures?
- d) Do the results of the thesis allow their publication in a respected economic journal?
- e) Are there any additional major comments on what should be improved?
- f) What is your overall assessment of the thesis? (a) I recommend the thesis for defense without substantial changes, (b) the thesis can be defended after revision indicated in my comments, (c) not-defendable in this form.

(Note: The report should be at least 2 pages long.)

The thesis under consideration is a collection of the three papers that all present original contribution to the financial econometrics and asset pricing literature. The unifying theme of the three papers is an endeavor to improve our understanding of how economic agents perceive, understand, and price risks. The main contribution with this respect is a new framework which can be used to relate risk factors to extreme tail events or a whole distribution of asset returns. This is an essential step since current strand of the literature approximates the behavior of agents by an average behavior assuming agents maximize expected utilities from consumption. Changing the assumption to quantile preference makers and deriving the link between simple quantile factor asset pricing model is an important step in our understanding of how agents with different risk attitudes value assets. The thesis contributes to the contemporaneous state of art theoretically as well as empirically. From the theoretical side, the thesis develops three distinct frameworks. First, it introduces a new model for multivariate volatility modeling and forecasting. Second, it develops a simple model that can control for otherwise unobserved heterogeneity among financial assets and allows us to exploit common factors in the panel of asset return quantiles and their volatilities. Third, the thesis develops a dynamic multi-factor quantile model for asset pricing. On the empirical side, the thesis brings new original results about behavior of financial time series concentrating on its multivariate nature, as well as distributional features.


Originality and usefulness of the results is also highlighted by the fact that first part of the results focusing on improved forecasting of multivariate volatilities have been published in one of the leading journals in financial forecasting, *Journal of Forecasting* and drew 17 citations during the first 3 years (published in May 2016) as of the day this report has been written. The second, and the third paper have been presented at few internationally recognized conferences leading the field, and the presentations attracted attention and good discussion by leading experts including Antonio Galvao, Wolfgang Hardle, or Roger Koenker. The last paper is finished only recently moreover opens many new interesting questions in asset pricing and moves classical factor pricing literature from aggregate average toward quantiles. With this respect, I expect publication of the two separate papers in the highly ranked journals since they constitute a contribution relevant to a broad readership in finance. Let me briefly discuss the contributions separately.

The first paper contributes to the risk modeling and forecasting literature by proposing a new model for the dynamic covariance matrix. Employing a system of seemingly unrelated regressions to model and forecast realized covariance matrix, the paper introduces a new multivariate Heterogeneous Autoregressive model that empirically outperforms competing models regarding economic gains. In an empirical study, the paper also contributes to the literature with large comparative economic as well as statistical evaluation of existing approaches. The paper is already published and is received well as mentioned above.

Although predictions about expected returns are essential for understating of classical asset pricing, little is known about the potential of the factors to precisely identify extreme tail events of the returns distribution. More importantly, even less is known about commonalities between more assets with this respect. The second paper contributes in this direction and investigates how to measure common market risk factors in tails of the return distribution. By exploring the fact that volatility crosses all quantiles of the return distribution, and using penalized fixed effects estimator we can control for otherwise unobserved heterogeneity among financial assets. Direct benefits of modeling the panel of return quantiles are revealed in the portfolio application. Overall results are important for correct identification of the sources of systemic risk and are particularly attractive for high dimensional applications.

Asset pricing models explaining risk valuation theoretically assume an economic agent who decides based on the preference about her consumption by maximizing an expected utility function. However, these preferences may be too restrictive to deliver satisfactory description of the real behavior of agents. Instead of working with standard expected utilities, recent literature strives to incorporate heterogeneity into dynamic economic models assuming agents maximize their stream of future quantile utilities. The third paper contributes to this strand of literature and develops a dynamic quantile model for bond pricing with an agent who values securities by maximizing quantile level of her utility function. The transition from traditional to quantile preferences allows studying the pricing of the term structure of interest rates by the economic agents differing at their risk aversion. Moreover, the framework is robust to fat tails commonly observed in the empirical data. In the application, paper justifies the approach by quantile pricing of the two, five, ten and thirty years US and German government bonds.

In conclusion, the dissertation discusses a wide range of problems in risk modeling and empirical asset pricing theoretically and applies them to three appealing empirical problems. The thesis proposes new important concepts pushing the state of the current knowledge, as they allow us to improve our understanding of the quantile-specific behavior of economic agents in the described situations. The work is original, contributive, it is done rigorously. Hence my overall assessment of the thesis is (a) the thesis can be defended without substantial changes.

Date:	
Opponent's Signature:	
Opponent's Affiliation:	Doc. PhDr. Josef Baruník, Ph.D. IES FSV UK