

Report on Master Thesis

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

Student:	Marek Lipán
Advisor:	Jozef Baruník
Title of the thesis:	Artificial Prediction Markets, Forecast Combinations and Classical Time Series

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

Contribution

Literature interested in time series forecasting developed numerous distinct frameworks for the forecasting task. While one of the most promising routes is combination of forecasts, no comprehensive study compared all distinct existing methodologies. The main motivation of the thesis is to rigorously compare wide spectrum of approaches. The thesis is unique with its wide scope that includes simple combinations, through factor analysis, shrinkage methods, bayesian model averaging to alternative neural networks, and artificial prediction markets.

Marek even goes further and is confident to propose a new simple artificial prediction market designed for combining time series forecasts, and rigorously compares its performance to popular forecast combination methods. The contribution is hence twofold: first, new method is developed, second, its performance is compared to large number of existing methodologies. Here I would like to stress that to the best of my knowledge, this thesis is one of the first works which systematically compares predictive ability of such distinct and wide spectrum of methodologies for forecasts. Moreover, newly proposed Market for Kernels is able to compete with best existing methodologies. Marek choses two distinct datasets to test the performance stability making the results interesting to wide audience. Namely, forecasts of ECB Survey of Professional Forecasters and forecasts of the realized volatility of the U.S. Treasury futures log-returns are used as a main dataset.

With this respect, the thesis brings original contribution that is interesting to a wide audience searching for a good predictive performance. Without a doubt, specialized journals like *Journal of Forecasting*, or maybe even *International Journal of Forecasting* could be interested in publishing the results.

Methods

Marek works with large number of existing methodologies from simple combinations, through factor analysis, shrinkage methods, bayesian model averaging to alternative neural networks, and artificial prediction markets. Reading the thesis, one quickly learns how deeply Marek understands all the frameworks. It is important to note that Marek wrote a publicly available script for all the methods highlighting even more the level of understanding and endless effort he put into the thesis.

Literature

Working with such a wide spectrum of methodologies itself proves deep knowledge of literature. A short survey of most important concepts in each approach further shows confidence of Marek to build such a wide exercise.

Manuscript form

It is surprising how well Marek masters the text under so many methodologies, and concepts used. The text is logical, well written, connectes findings to the existing literature well, and walks teh reader through the results easily. Marek worked consistently to obtain the results for a long period, and we have discussed the results on regular basis during the year.

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Summary and suggested questions for the discussion during the defense

In conclusion, I believe that during the work Marek proved himself to be an independent researched, and obtained results interesting to wider audience. As a result of his hard work, we are able to read excellent piece of work. The thesis hence deserves to be defended without doubts, I suggest to consider grade „A“ as well as excellent thesis award.

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

CATEGORY	POINTS
<i>Contribution</i> (max. 30 points)	30
<i>Methods</i> (max. 30 points)	30
<i>Literature</i> (max. 20 points)	20
<i>Manuscript Form</i> (max. 20 points)	20
TOTAL POINTS (max. 100 points)	100
GRADE (A – B – C – D – E – F)	A

NAME OF THE REFEREE: Jozef Baruník

DATE OF EVALUATION: September 10, 2018

Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
30	15	0

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
30	15	0

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
20	10	0

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

<i>Strong</i>	<i>Average</i>	<i>Weak</i>
20	10	0

Overall grading:

TOTAL	GRADE
91 – 100	A
81 - 90	B
71 - 80	C
61 – 70	D
51 – 60	E
0 – 50	F