

Report on Master Thesis

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

Student:	Bc. Diana Žigraiová
Advisor:	PhDr. Ing. Petr Jakubík Ph.D.
Title of the thesis:	Systemic Risks Assessment and Systemic Events Prediction: Early Warning System Design for the Czech Republic

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

This master thesis deals with ability of predicting negative systemic events. It is quite well written, using very good English, based on recent literature and well presented. I consider the problem to be clearly explained and well justified. Author uses recent literature and uses many advanced techniques.

However I see some imperfections, language mistakes and unclear issues, which I consider to be negligible. However there are few issues that I would like to mention explicitly:

- 1) I would welcome the equations used to be properly numbered, so that they can be better referenced. Best choice would be to use LaTeX.
- 2) On page 16, in the second equation, I wouldn't call the FSI unweighted as it is a particular example of the above equation of weighted FSI.
- 3) I would like to see justification of using MCMC methods for BMA as $4,5 \cdot 10^7$ iterations out of space consisting of $2^{78} = 3,02 \cdot 10^{23}$ possibilities means we search only very small part of the entire world. I understand that author uses published results of other authors, but anyway I would like to see some short justification, like how many cases are enough (in other words, what is the convergence speed). However I very much like the chapter 6.3 as an interesting piece of practically used theory.
- 4) My major objection to the whole work is connected to chapters 7.2 and 7.3. I am persuaded that the models developed are highly overfitted as they have much better performance on the in-sample than on the out-of-sample. The difference between Gini coefficients are huge (models performances measured by Gini on in-sample data are between 0,8-0,9, while the same models perform quite worse on out-of-sample data – Gini equals 0,382 for one model and even 0,198 for the second. I am very much afraid, that these prediction models would fail in detecting future negative systemic events. I would recommend to further filter the predictors chosen by BMA method using for example stepwise or forward selection methods.
- 5) In the application of the developed model on the Czech Republic data, I did not understand the evaluation sentence: "Overall both models performed very well in-sample with the difference between long and short model on full data in terms of utility of 3.3%, PCP of 2.7%, percentage of crises predicted of 0%, NtS ratio of 35,4% and finally area under ROC curve of 0.5%." This information is not in line with the performance measures presented in table 8.7. Moreover, I missed the out-of-sample performance as I am also persuaded that the model is overfitted.

Overall assessment: I very much appreciate the amount of work done, using R statistical software and using recent literature and very sophisticated and interesting methods. Author seems to be well educated in statistical methods and seems to study interesting parts of not commonly used theory. Correctly estimated model of this type would be very appreciated and could prevent economical damage of high extent. Therefore the selected topic is of a high importance and is current. I would recommend the author to utilize methods preventing or at least mitigating overfitting.

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After this small correction, the results can be very interesting and surely would be worth of further study in a Ph.D. study program and publication.

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

CATEGORY	POINTS
Literature (max. 20 points)	20
Methods (max. 30 points)	25
Contribution (max. 30 points)	25
Manuscript Form (max. 20 points)	15
TOTAL POINTS (max. 100 points)	85
GRADE (1 – 2 – 3 – 4)	1

NAME OF THE REFEREE: Pavel Doležel

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Referee Signature