

Advisor's Report on Dissertation Thesis

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Title of the Thesis:	Four Essays on Applied Bayesian Econometrics
Type of Defense:	DEFENSE
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General Assessment:

The dissertation is divided into four main chapters, which can be seen as four relatively independent, but mutually related, academic papers. All of them apply Bayesian econometric techniques to analyse macroeconomic and macro-financial developments in the economy. The introduction provides a motivation for the use of Bayesian econometric methods, which connects the four main chapters and summarises the main results of each essay. The first essay focuses on nowcasting the GDP growth of the main trading partners of the Czech Republic. The second essay analyses the development of euro area sovereign bond yields using a time-varying factor. The third essay studies the non-linear effects of financial stress on Central and Eastern European exchange rate dynamics. The final essay studies the evolution of systematic risk in major banking sectors using time-varying CAPM (capital assets pricing model) betas.

The topics studied by this dissertation are very interesting, not only from the academic point of view, but also from the practical one. On the theoretical side, the essays use the state-of-the-art Bayesian techniques which have become popular in recent years. On the practical side, the topics under study are relevant to and analysed by central banks, other policymakers, or commercial banks. The techniques introduced in the first essay are now regularly used in the Czech National Bank for nowcasting foreign GDP growth rates; the results of the second essay were mentioned in the Financial Stability Review of the European Central Bank.

Original contribution of the author:

As stated in the previous section, I recognise the original contribution of the author both on the theoretical but also practical side. I would also like to highlight that the author independently wrote codes for the estimation, so he was not limited by codes available on the internet, and was able to write estimation procedures tailored for the studied topics. In addition, one could observe that the quality of the presentation of the results and style of writing has improved with time (the first essay is the most recent one, the last essay was written in the first year of the author's Ph.D. studies).

- The first essay is the most practical one and proposes a semi-automatic approach to nowcasting GDP growth rates or several countries relatively quickly. This is quite novel, in that forecasters are usually interested in nowcasting (or forecasting) GDP growth only in one country. The essay shows that the recommended approach, although relatively simple, can be successfully applied in practice.
- The second essay is most advanced in terms of methodology. It employs a factor model with time-varying loading coefficients and stochastic volatility, which allows for capturing changes in the pricing mechanism of bond yields. Since this model is heavily

overparameterized, Bayesian techniques are a clear candidate for its estimation. However, the standard techniques are very computationally demanding, so the author extends a method used in the literature (Chan and Jeliazkov, 2009) for simulating state-space models for the FAVAR model. This method is relatively fast and avoids the use of the computationally demanding Kalman filter.

- The third essay is original in that it studies the non-linear impact of increased financial stress in the euro area on exchange rate dynamics in CEE countries. Although this phenomenon had been studied before, the literature assumed that the relationship is linear. The essay employs Bayesian Markov-switching VAR, which is a very suitable model for this topic.
- In the final essay, a new technique (Bayesian state-space model with stochastic volatility) is applied to study the dynamics of the banking sector before the last financial crisis. The previous literature had used GARCH or simple state space models; the essay essentially combines the advantages of both approaches.

The literature review, the technical and forma presentation

The literature reviews consist of both theoretical and empirical parts relevant for the given topic. They show what motivates the approach taken by each thesis and where the essay fits in. The essays are well-balanced, logically structured, and read well. In addition, they are written succinctly and do not contain unnecessary digressions. The technical information is clear and succinct, and as the essays have been published already, the methodology focuses only on the specific problems at hand. It therefore presents only the main equations, general estimation techniques and detailed explanation of specific issues which are not described in references.

Definability of the thesis

The research design is above standard for a Ph.D thesis. This thesis is certainly defensible at the Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague, other respected universities in the Czech Republic, and I believe also at many universities abroad.

Publication potential of the thesis

The third essay appeared in the Journal of Financial Stability. The fourth essay featured in the Czech Journal of Economics and Finance. In addition, all four essays were published as reviewed working papers. The first and third essay were published as Czech National Bank working papers (for which two external and one internal referee reports were written). The second essay was published as a European Central Bank working paper. The final essay was published as an IES working paper.

Overall assessment

I recommend the thesis for defence without substantial

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