Report on Bachelor Thesis

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

Student: **Jiří Teichman**
Advisor: **PhDr. Jiří Kukačka, Ph.D.**
Title of the thesis: **Heterogeneous Agent Model of Housing Market in Ireland**

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

The thesis "Heterogeneous Agent Model of Housing Market in Ireland" proposes an extension of a recently developed (Kouwenberg & Zwinkels, 2014, IJF) heterogeneous agent model (HAM) for the U.S. housing market and applies the HAM methodology to one of the most challenging housing markets in Europe, Ireland, that lately experienced an unprecedented property bubble. Needless to say that while standard approaches largely fail in such financial turmoil periods, HAMs have proven successful in explaining and modelling an emergence of asset market bubbles followed by sudden crashes. Moreover, behavioural models are optimal candidates to analyse markets where the rationality of investors can be reasonably assumed as highly restrained.

I am pleased to summarise at the very beginning that **Jiří has written an excellent piece of work** and due to outstanding quality of the entire thesis **I can honestly suggest the highest grade (1)**. The **main contribution of the thesis is threefold**. 1) it is the first application of HAM on the housing market in Ireland (it is important to stress that there are only very few applications to European markets in the related literature). 2) due to specific nature of Irish data compared to the benchmark U.S. dataset, Jiří had to develop new methods for approximation of the growth rate of rents and expected rent yield, that create the basis for the fundamental value calculation in the model. After an extended empirical analysis, Jiří's approach is largely superior for Irish data compared to versions suggested by original authors for data from the U.S. and it brings empirical results with very good economic rationale allowing for strong economic interpretation. Finally, Jiří elaborated a high-quality analysis of the macroeconomic and housing market situation in Ireland during past decades which itself brings an important value added of the thesis.

Jiří managed to get familiar with relatively intellectually demanding field of HAMs with ease, coded the Kouwenberg & Zwinkels (2014) model himself using Wolfram Mathematica and rigorously extended the toolkit of the FV approximation methods. This required not only smart ideas but also loads of simulation as well as empirical testing. Jiří also coded new tools when the standard Mathematica library was insufficient, e.g. the optimisation algorithm for the quasi-ML estimation. An important and demanding effort was also related to data gathering. Jiří demonstrated strong quantitative skills and mastered not only selected tools of econometric analysis but also the field of computational simulations in economics research.

The **cooperation with Jiří from my advisor's point of view was excellent**. Jiří showed ability to independently suggest solutions to many non-trivial issues emerging during the research as well as to focus on a detailed and very elaborate analysis. Jiří worked hard on the bachelor thesis research for the entire year and consulted the progress on regular basis. Jiří was able not only to clearly put the hypotheses to test but also very critically interpret the (not always favourable) results and finally come to conclusions valuable for the housing market research. I would also like to stress the fact (that might not be seen when only reading the final work) that a lot of already written text and elaborated analysis was discarded during the finalisation works in order to keep high level of research focus, consistency, and clarity of the final thesis.

The aim, design, working hypotheses, and conclusion are clearly stated and carefully elaborated. The work is well structured and formally more than meets very high academic standards. Moreover, and very importantly, it contributes to recent findings in literature. The text of the thesis is supplemented by an electronic archive containing source codes and data so that everyone can verify the results.

Suggested question for the defense:

- Compare and contrast the most important advantages of your proposed EWMA approximation of the FV with the other three analysed options. In which aspects/for which analysed areas is the EWMA clearly superior and in which does it bring comparable results? Moreover, are there any disadvantages/drawbacks of the EWMA approximation? Finally, can you find possible economic interpretation/rationale why EWMA consistently beats other analysed approaches?

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Summary:
I do find this thesis **strongly surpassing academic standards for bachelors theses written at IES**. Personally considered, the rigorous testing of new methods for the FV approximation that unambiguously bring contributive results for the field, the elaborate macroeconomics summary, and extensive computational analysis utilising advanced techniques are the most distinctive qualities of the work.

I am very pleased **I can recommend the thesis of Jiří Teichman to defense at the IES FSV UK. With no doubts, I suggest the grade "1". i.e. "excellent"**. If case this option still applies for current third-year students and Jiří manages the defense procedure well, I kindly recommend the committee to consider an **award for an extraordinarily good thesis**.

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

CATEGORY		POINTS
Literature	*(max. 20 points)*	19
Methods	*(max. 30 points)*	30
Contribution	*(max. 30 points)*	28
Manuscript Form	*(max. 20 points)*	20
TOTAL POINTS	*(max. 100 points)*	**97**
GRADE	**(1 – 2 – 3 – 4)**	**1**

NAME OF THE REFEREE: Jiří Kukačka
DATE OF EVALUATION: 1. 6. 2016

Jiří Kukačka

Digitally signed by Jiri Kukacka
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EXPLANATION OF CATEGORIES AND SCALE:

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

Strong	Average	Weak
20	10	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.*

Strong	Average	Weak
30	15	0

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.*

Strong	Average	Weak
30	15	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.*

Strong	Average	Weak
20	10	0

Overall grading:

TOTAL POINTS	**GRADE**		
81 – 100	**1**	= excellent	= výborně
61 – 80	**2**	= good	= velmi dobře
41 – 60	**3**	= satisfactory	= dobře
0 – 40	**4**	= fail	= nedoporučuji k obhajobě