Report on **Bachelor / Master Thesis**

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

Student:	**Ivana Gallova**
Advisor:	**Petr Pleticha, M.Sc.**
Title of the thesis:	**How much do we pay for a real estate ownership? A simulation approach**

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

Contribution

The bachelor thesis by Ivana Gallova provides a comparison of the financial prospects of the rent payment vs. apartment ownership from 2008 until recently (2019) in the Czech Republic. The methodology is based on calculations of the net present values (NPV) of the two options for studied years based on a set of assumptions for the projection to the 10-year future. The main contribution is twofold: first, the author focuses on the Czech Republic as a whole while other studies in the past focused mostly on specific regions, namely Prague. Second, it brings up-to-date information for the year 2019 and interestingly compares the post-global financial crisis period, which is well known for a significant drop in appartment prices followed by a stagnation, with the recent past which has by many been referred even as „another housing market bubble" especially in large Czech cities.

The set of specific assumptions makes the computations and comparisons feasible and I completely understand that some simplifications or setup choices must have been made arbitrarily. But it is important to stress that the conclusions are likely highly dependent on the selected setup and might be considerably sensitive to that. In my opinion, this could have been discussed more in the text because especially aggregation of the statistical data over the Czech Republic as a whole makes the result very general and not very applicable to specific regions or a specific situation of individual people. One example for all: the average price of an apartment 68.5 m squared for 2019 is below CZK 2 million (Tab. 6.1). This is incomparable e.g. to the housing market situation in Prague or Brno. The *„new approach aimed at the whole republic"* (pg. 32) can that become a weakness instead of a contribution. Moreover, the NPV is computed for the holding period of 10 years, but one of the main results of the thesis is that the optimal holding period in 2008 is 17 years while in 2013 it is only 1.83 years. Does not the fixation to 10 years influence the results favouring one of the two choices?

Last, the authorsuggests in the conclusion that *"Compelling finding is that the rent value had positive effect on the apartment prices and vice versa, meaning that higher prices of one tenure choice increases demand and also the prices for the other one."* Unfortunately, I am afraid that instead of a compelling finding this is rather an indication of the endogeneity problem. The author might want to think about that and discuss the potential endogeneity issue with the defense committee.

Methods

The thesis takes advantage of the time-series modelling approaches beyond the bachelor level curriculum (seasonal ARIMA with exogenous variable). Next, the standard NPV computation framework is used, and a simulation approach for the forecasting exercise is implemented. I have several important remarks on the methodological side which the author might want to explain in detail or clarify during the defense:

- Data: is it necessary to average monthly data to get quarterly data for all variables where applied? If the data point aims at averaging situation in the given quarter, then it makes perfect sense, but if it is only a „snapshot" at the end of the quarter, than it does not. It is also not explained why some variables are log-transformed. Finally, why do you talk about panel data when then the panel feature is (as far as I understand) not taken into account at all.
- The text, unfortunately, did not persuade me that the author understands the theory beyond the time-series analysis well. E.g. ARIMA model does not really consist of three parts, it consists of two parts (AR and MA) and „I" in the middle just indicates the level of the time series differencing to gain stationarity for the ARMA modelling. Wrt this, what is the difference between eg. 4.3 and 4.4.? Should or should not the right hand-sides be the same?

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- ADF test: not explained what „rho" actually stands for (eq. 4.7).
- Section 4.4. Validation is insufficiently described. E.g. what are those „roots"?
- I also do not understand what the author means by *„After the forecast is done it is important to test the accuracy, to check whether our model is well specified or has accurate inputs"* (pg 15). I honestly believe that the last two steps must be finished BEFORE the forecast is done.
- Finally, it is very unclear to me from the description how the AR(I)MA model (eq. 4.4) is combined with the exogenous variables (eq. 5.1 and 5.2 which looks like a cross-sectional regression). This is a crucial methodological step which definitely needs clarification.

Literature
The Literature review chapter is well elaborated and I enjoyed reading this part. It is important that the author takes into account the most recent papers (2016, 2020) and structures the chapter in an analytical fashion to several subtopics. The text also cites other diploma theses dealing with to some extent similar topics but discusses correctly the distinguishing features. What I appreciate the most is that while the analysis in the later chapters is based on a purely „technical" approach, the author correctly stresses that the *„financial aspect is not everything"* and devotes some space of this chapter to the topics of happiness or subjective well-being which can hardly enter the NPV the formula, but might be one of the main decision-making forces beyond the rent vs. home-ownership question.

Manuscript form
I need to appreciate that the thesis is written in decent English and typeset in LaTeX. One more round of proofreading would help to avoid various typos or text imperfections, e.g. *„The ministry did a (????)"* on pg. 9. „Differencing" should be used instead of „differentiation". In Tab. 6.1. the difference is not 4.1 percent (pg. 28) but 4.1 percentage points. It makes a huge difference in fact. The tables are often not completely self-contained. Bibliography seems complete, yet there are some tiny typesetting errors (e.g. in Baroni et al., 2007; american dream).

Summary and suggested questions for the discussion during the defense
The thesis meets the IES bachelor theses standards and I can recommend it for the defense and suggest the grade C.
The results of the Urkund analysis do not indicate significant text similarity with other available sources.

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

CATEGORY		**POINTS**
Contribution	*(max. 30 points)*	22
Methods	*(max. 30 points)*	22
Literature	*(max. 20 points)*	18
Manuscript Form	*(max. 20 points)*	16
TOTAL POINTS	*(max. 100 points)*	**78**
GRADE	**(A – B – C – D – E – F)**	**C**

NAME OF THE REFEREE: Jiri Kukacka

DATE OF EVALUATION: 28. 8. 2020

Jiri Kukacka
Digitally signed by Jiri Kukacka
Date: 2020.09.01 12:53:50 +02'00'

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.*

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.*

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

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.*

Overall grading:

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