Report on Master Thesis

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

Student:	**Bc. Olga Mironova**
Advisor:	**doc. PhDr. Zuzana Havránková, Ph.D.**
Title of the thesis:	**Daylight saving time and trafic safety: Evidence from the Czech Republic**

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

Please provide a short summary of the thesis, your assessment of each of the four key categories, and an overall evaluation and suggested questions for the discussion. The minimum length of the report is 300 words.

Short summary

The thesis studies the effects of use of the daylight saving time (DST), in particular its immediate and short-term effect on the number of traffic accidents in the Czech Republic. The author analyzes a data set spanning 2006 to 2019 using various generalized linear regression models in order to find evidence for the claim that DST has no significant effect on traffic accidents in the short run perior and that it can reduce traffic accidents and reduce fatal crashes in the long run period.

Contribution and Methods

The author applies different methods for the study of the long run and for the short run effects of transitions into and out of DST. For the long run period she applies Generalized linear models (Poisson regression and Negative Binomial regression models) and for the short run period she applies Regression discontinuity design models.

The level of mathematical rigor in sections 3.2 and 3.3. is the weakest point of this thesis.

The model formulated on page 14 does not include disturbances and thus a reader previously unexposed to GLMs could easily be confused about the seemingly missing regression model. Switching between bold beta and standard script beta makes the intepretation of its meaning confusing from the very start. Switching between Pr(y_i|\mu_i) and Pr(y_i|x_i) does not help either. **The two sentences** „The Hessian is negative definite for all x and beta“ and „There is no analytical solution for beta hat“ written one after another (page 14, lines 1 and 2 from below) **create a false notion that there is a causality between these two statements.** In fact, the negative definite Hessian of log likelihood function makes the function (– ln L) strictly convex twice differentiable function for which any gradient descent method, not just Newton's method, can be effectively used to find its global minimum.

As of section 3.2.3 the author refuses to write transposition signs in the scalar products of vectors, making it inconsistent with section 3.2.1. The author wasted a potential to fully expose the structure of negative binomial distribution in the presentation on page 16 as a result of Poisson-Gamma mixture. **The author mistakenly presents gama distribution as a single-parameter distribution, along with an incorrect formula of its density.**

The unpaired use of brackets in the formula for z_i in the lower part of page 17 ruins any possibility to follow the author. The disaster of Chapter 3 is emphasized on page 18 when returning to bold variables x_i and z_i, undefined variable v_i and (supposedly) matrices M and D. The latter two can at least be reconstructed from the formulas for M \top M, D \top D and M \top D. Further, K as degrees of freedom of C is left unexplained. As e_i was defined as y_i-\mu_i, **the link between the two formulas is impossible to verify, partly due to undefined w_i hat.**

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I definitely object against refering to expectations as averages. Furthermore, the author repeatedly refers to histograms of empirical distributions as to densities, the more curiously as the figures themselves contain captions including the word histogram, cf. e.g. Figures 5.5-5.8 on page 49. Second year Bachelor students at IES know not to make such mistakes.

I can tolerate the athor's convention for „larger or equal" sign as a composition of „larger" and „equal" (page 21 and beyond). **I am convinced that the formulas for all kernel function on top of page 25 are incorrect. The the presented functionals would be true if their support is interval [0,1], while here the support is [-1, 1].** Furthermore, the literature states that triangular and rectangular (uniform) kernels lead to lower efficiency with respect to Epanechnikov kernel; thus the author's claim about the triangular kernel leading to a point estimator with optimal properties seem in conflict. **Does „MSE optimal" mean efficient?**

In the remainder of Section 3, the author resigns on any attempt of providing a background to the presented material and just introduces further formulas in a „cook book" style.

As such, I can only conclude that the author has utterly poor understanding of the theory behind the applied GLMs, as such rendering all numerical results of hers completely *untrustworthy*, seeing very little contribution in the presented numerical results; the more given the fact that Sections 4 and 5 no longer include any of the notation of Section 3. I rest my case with a note that the author claims to apply Quasi-Poission regression in her numerical experiments (page 45, line 14), while there is no mention of such model in Section 3.

Literature

The author refers to numerous studies on the topic. The literature overview in mostly focused on the overview of published outcomes of previous researches, and the level of detail may occasionally be difficult for the reader to absorb; less focus on detailed results and shorther exposition might have worked better. The decision to include a summary in section 2.2 was definitely a good idea. What I am missing is the information what methodologies were used in previous studies to be able to evaluate whether the type of model proposed by the author is a standard method or whether the author proposed an innovative approach.

I suspect that the literature overview by Carey and Sarma 2017 made is much easier for the author to cover relevant previous studies. In fact, only one study published after Carey and Sarma 2017 is included in Chapter 2 (Buennings and Schiele 2018), **no studies from past three years were included.**

Several references are displayed as incomplete records, namely Crawley 2012, Hillman 2008, Jacob et al 2012, Reincke et al 1999 and Sullivan and Flannagan 2002. The latter two appear to be technical reports, which, in view of being written 20 years ago, do not appear as trustworthy; alternatively the author did not search for the published versions of those manuscripts.

Manuscript form

The author has a moderate English proficiency, with noticable amount of typos, and on several occasions the statements are rather hard to digest. This occasionally results in an increased effort on the reader to decipher the intended meaning of the author's statements.

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Near systematic typesetting of dots and commas on the line below mathematical formulas is very displeasing.

The author includes multiple tables and figures in the main part of the manuscript. In fact, taking into account the length of the main part of the text, i.e. 57 pages, and the total space of all tables and figures within these 57 pages, **it raises a question whether the author fullfilled the required minimum of 50 norm pages of the text**. Furthermore, the author uses various scaling for the presented figures which sometimes seem unnecessarily large, e.g. Figure 4.1, or unbearably small, e.g. Figure 5.10.

Moreover, some tables are typeset only two or more pages after its reference in the text, e.g. Table 5.3 mentioned on the top of page 46 to be found at the end of section 5.2.1 on page 48, which I find very distracting for the reader, in particular when commenting achieved numerical results.

What I find unconventional is the extent of supplemental material in appendices. Vast majority of the enclosed tables are not even referenced in the main text. I am unsure what was the intended motivation, but instead of being impressed I was overwhelmed in the negative sense and got an impression that the author cannot select which material is essential for the reader and thus she included literally everything. I always considered writing long texts much easier than compressing the same amount of information in a much shorter exposition. The author could at least structure the Appendix into multiple parts; all 165 pages are Appendix A titled „Title of Appendix A“.

Overall evaluation and suggested questions for the discussion during the defense

The results of the Urkund analysis do not indicate significant text similarity with other available sources.

Despite all criticism above, in my view, the thesis still fulfills the requirements for a master thesis at IES, Faculty of Social Sciences, Charles University, I recommend it for the defense and suggest a **grade E**.

Many of my objections and questions which are suitable for the discussion during the thesis defense were already stated in the text above, highligted in bold.

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

CATEGORY		**POINTS**
Contribution	*(max. 30 points)*	13
Methods	*(max. 30 points)*	15
Literature	*(max. 20 points)*	14
Manuscript Form	*(max. 20 points)*	9
TOTAL POINTS	*(max. 100 points)*	**51**
GRADE	**(A – B – C – D – E – F)**	**E**

NAME OF THE REFEREE: RNDr. Michal Červinka, Ph.D.

DATE OF EVALUATION: 8.6.2021

Michal Červinka

Digitally signed by Michal Červinka
Date: 2021.06.08 23:56:55 +02'00'

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.*

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**