

Report on Master Thesis

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

Student:	Bc. Jan Provazník
Advisor:	RNDr. Michal Červinka, Ph.D.
Title of the thesis:	Consistency of S-weighted estimators in panel data models

Short summary

This thesis explores S-weighted estimators, providing a comprehensive analysis of its performance compared to other robust estimation methods. It addresses key aspects of robust regression techniques, including the estimator's theoretical background, its algorithmic implementation, and an empirical performance evaluation through simulation studies.

Sadly, the author did not consult the thesis at any time between the topic being assigned and the thesis being submitted. As such, I do not feel to be in the role of a supervisor when writing this review. As such, my review could be considered as another opponent's review.

What's worse, the author deviates from the original plan and does not deliver on any of the promised outputs from the thesis proposal. That is, he does show neither Hypothesis #1, #2 nor #3 from the proposal. In fact, the title of the thesis is completely misleading as the author does not deliver on consistency for panel data, nor simulations on panel data. Giving up on that by stating „(it) turned out to be an insurmountable obstacle while promising a very little use“ (cf page 2) is completely unacceptable.

Contribution

The thesis offers significant insights into the S-weighted estimator as a unified method that combines features of the least weighted squares (LWS) and S-estimator. The research fills a gap in the existing literature by conducting a side-by-side comparison of these methods in the context of contaminated data. The practical implementation of the estimator in Python, accompanied by a detailed code breakdown, offers only a minor accomplishment and feels rather improper to be included in the thesis (could have been an appendix), although it may be a suitable resource for researchers seeking to apply the method in real-world scenarios.

The major issue, as already mentioned above, is the complete mismatch on promised outcomes from the thesis proposal.

Methods

The thesis employs a robust simulation study to evaluate the performance of four estimators (OLS, LWS, S-estimator, and S-weighted estimator) under various types of data contamination. The analysis shows that while all robust methods handle contamination up to 10% effectively, the S-weighted estimator behaves similarly to LWS for low contamination levels and to the S-estimator in high contamination settings. The results suggest that the LWS method is the most reliable overall, but the S-weighted estimator demonstrates the potential to serve as a versatile tool, particularly in scenarios with mixed contamination. As such, this is definitely a positive outcome of the manuscript.

Literature

The literature used is limited, but that was to be expected considering the scarcity of research on the topic. References are appropriately cited, reflecting a solid understanding of the current state of the field and supporting the study's methodology and findings with well-chosen sources.

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Manuscript form

The thesis is logically organized and consistently uses appropriate academic language. The student's use of English is nearly flawless. Tables and figures are well-designed and effectively integrated into the text, enhancing the overall readability and coherence.

Overall evaluation and suggested questions for the discussion during the defense

In my view, the thesis fulfills the requirements for a master thesis at IES, Faculty of Social Sciences, Charles University, despite deviating significantly from the proposal, which majorly affects my suggestion for a grade. I recommend it for the defense and suggest a **grade E**. The results of the Turnitin analysis do not indicate significant text similarity with other available sources.

I suggest the following questions/tasks to be raised during the thesis defense:

- The influence function (IF) introduced in definition 2.4 is not a paralel concept to a derivative of a real function. First of all, it is a derivative-like object to a functional (mapping of functions to functions) and, moreover, it is of the form of a Gateaux directional derivative. This object however need not exist to all inputs of T and F. So, under which conditions on T and F does IF exist? In other words, under which conditionson is fuctional T being G-differentiable? This question is of essential importance as there may be cases where the supremum in definition 2.5 is taken over an empty set. Or is it?
- On page 15 (and other) you mention a concept of $f(n)$ -consistency. Explain to the committee the definition and relationship to a "classical" concept of (weak/strong) consistency.
- On page 18 (and other) you mention a function being Lipschitz. Explain to the committee the defition of Lipschitz continuity and illuminate this property on graphs of several real functions.
- Explain the concept of "Mahalanobis distance", its properties and key applications.

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

CATEGORY	POINTS
Contribution (max. 30 points)	5
Methods (max. 30 points)	15
Literature (max. 20 points)	18
Manuscript Form (max. 20 points)	18
TOTAL POINTS (max. 100 points)	56
GRADE (A – B – C – D – E – F)	E

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

DATE OF EVALUATION: 17.9.2024

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