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SCHOOL OF APPLIED MATHEMATICS

CAIO F. LINS PEIXOTO

LINEAR INVERSE PROBLEMS AND NONPARAMETRIC REGRESSION METHODS IN INSTRUMENTAL VARIABLE ESTIMATION

Rio de Janeiro
2023

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Bachelor's dissertation presented to the School of Applied Mathematics (FGV/EMAp) to obtain the Bachelor's degree in Applied Mathematics.

Area of Study: Linear Inverse Problems, Kernel Methods, Machine Learning, Nonparametric Statistics, Instrumental Variable Regression.

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Approved on December —-, 2023
By the organizing committee

Yuri F. Saporito
School of Applied Mathematics

Board Member 1
Institution 1

Board Member 2
Institution 2

I dedicate this thesis to …

Acknowledgements

Thanks, ...

“ Bipedi bopedi bum! ”

Albert Einstein

Abstract

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Resumo

Palavras-chave:

List of Figures

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Contents

1 Introduction

Remember to cite every person (NEWEY; POWELL, 2003).

2 Application in Econometrics: Instrumental Variable Regression

In this chapter, we turn our attention back to the main application being considered in this thesis: instrumental variable regression. We start by formally characterizing the type of problem this econometric approach was developed to solve, and then present one of the most well-known and employed estimation procedures for conducting it: two stages least squares (2SLS). Nextly, we show how an IV regression problem can be formulated as a linear inverse problem and discuss the seminal nonparametric method of Newey and Powell (NEWEY; POWELL, 2003), followed by a more recent nonparametric approach called Kernel Instrumental Variable (KIV) (SINGH; SAHANI; GRETTON, 2019). We finish with an in-depth analysis of our method, pointing out its relationship to other methods, as well as its strengths and weaknesses.

Is it?

2.1 The Method of Instrumental Variables

3 Conclusion

References

NEWEY, Whitney K.; POWELL, James L. Instrumental Variable Estimation of Nonparametric Models. **Econometrica**, v. 71, n. 5, p. 1565–1578, 2003. DOI: http://dx.doi.org/10.1111/1468-0262.00459.

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Appendix