

# Contents

<b>1</b>	<b>Introduction</b>	<b>6</b>
<b>2</b>	<b>Robust statistics</b>	<b>9</b>
2.1	Principles of robust statistics . . . . .	9
2.2	Main concepts . . . . .	11
2.3	Examples of robust estimators . . . . .	13
<b>3</b>	<b>Existing approaches to robust estimation with discrete explanatory variables</b>	<b>15</b>
<b>4</b>	<b>Smoothed least trimmed squares</b>	<b>17</b>
4.1	Linear regression model and least trimmed squares . . . . .	18
4.2	Definition of smoothed least trimmed squares . . . . .	21
4.3	Relation between SLTS and WLS estimators . . . . .	25
<b>5</b>	<b>Properties of smoothed least trimmed squares</b>	<b>27</b>
5.1	Consistency and asymptotic normality . . . . .	33
5.2	Properties of the estimator as a function of weights . . . . .	38
<b>6</b>	<b>Computational aspects</b>	<b>48</b>
6.1	Computation of SLTS for given weights . . . . .	49
6.1.1	LTS-like approximation . . . . .	49
6.1.2	Differential evolution approach . . . . .	52
6.2	Adaptive choice of weights . . . . .	53
<b>7</b>	<b>Simulations</b>	<b>65</b>
7.1	Adaptive choice with one parameter . . . . .	66

7.2	Adaptive choice with two parameters . . . . .	71
7.3	Misspecification of categorical variables . . . . .	75
<b>8</b>	<b>Conclusion</b>	<b>76</b>