



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ





شبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %



شبكة المعلومات الجامعية



بعض الوثائق الأصلية تالفة



شبكة المعلومات الجامعية



بالرسالة صفحات

لم ترد بالأصل



Cairo University



Faculty of Economics and Political Science

Department of Statistics

Handling Outliers using High-Breakdown and Bounded-Influence Robust Estimation in Linear Regression Models

By

Hazem Refaat Ahmed

Supervised by

Amany Mousa

Dr.Amany Mousa
Professor of Statistics

Department of Applied Statistics and
Econometrics

Institute of Statistical Studies and
Research
Cairo University

R. Mazloum

Dr.Reda Mazloum
Professor of Statistics
Department of Statistics

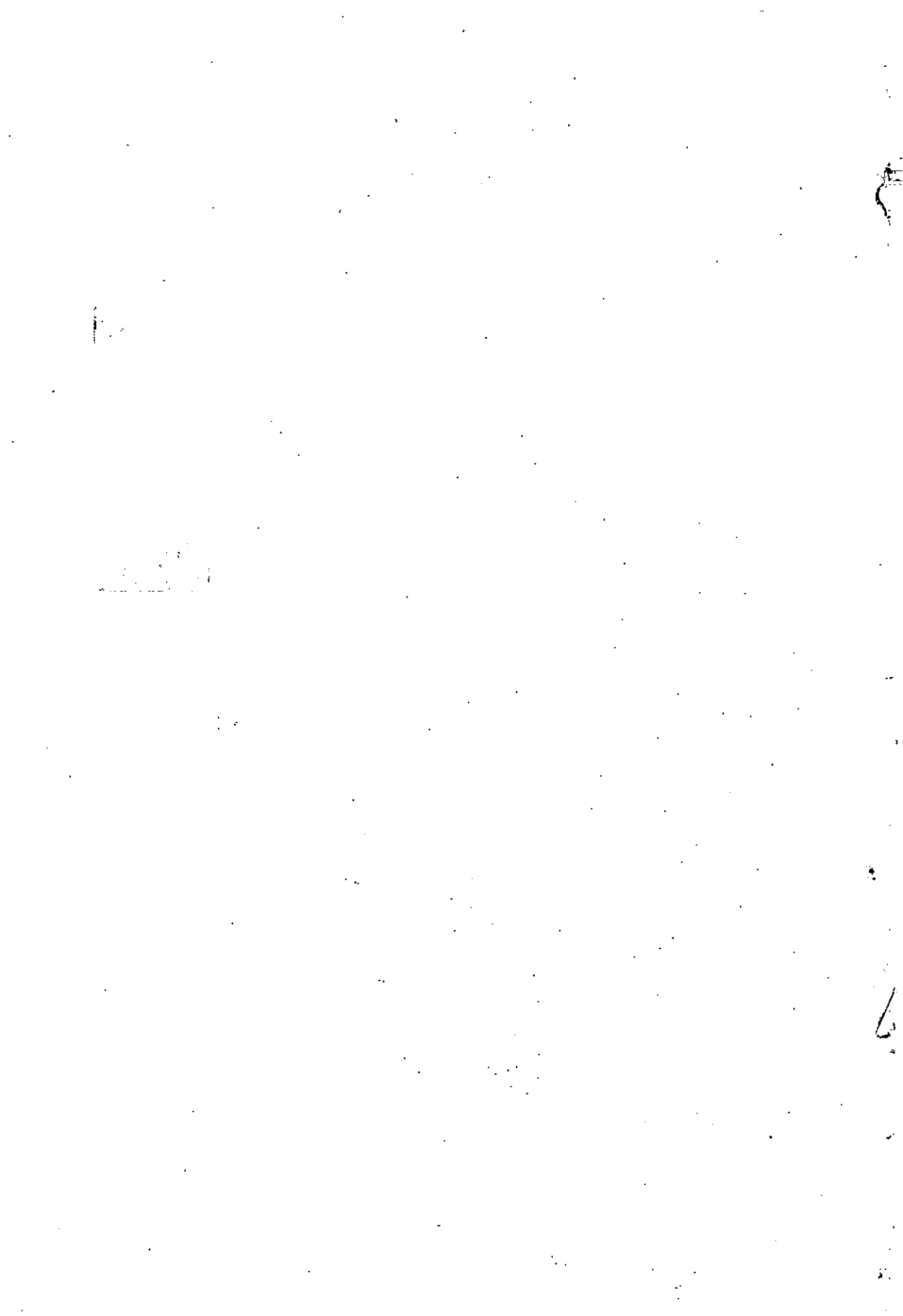
Faculty of Economics and Political Science

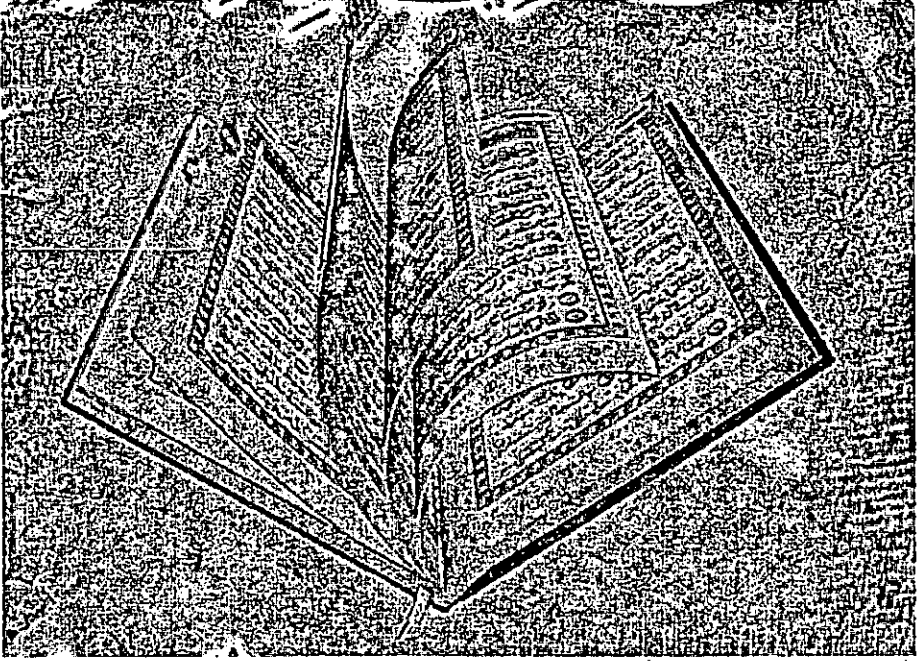
Cairo University

A Thesis submitted in Partial Fulfillment
of the requirements for M.Sc Degree in Statistics

B9C97

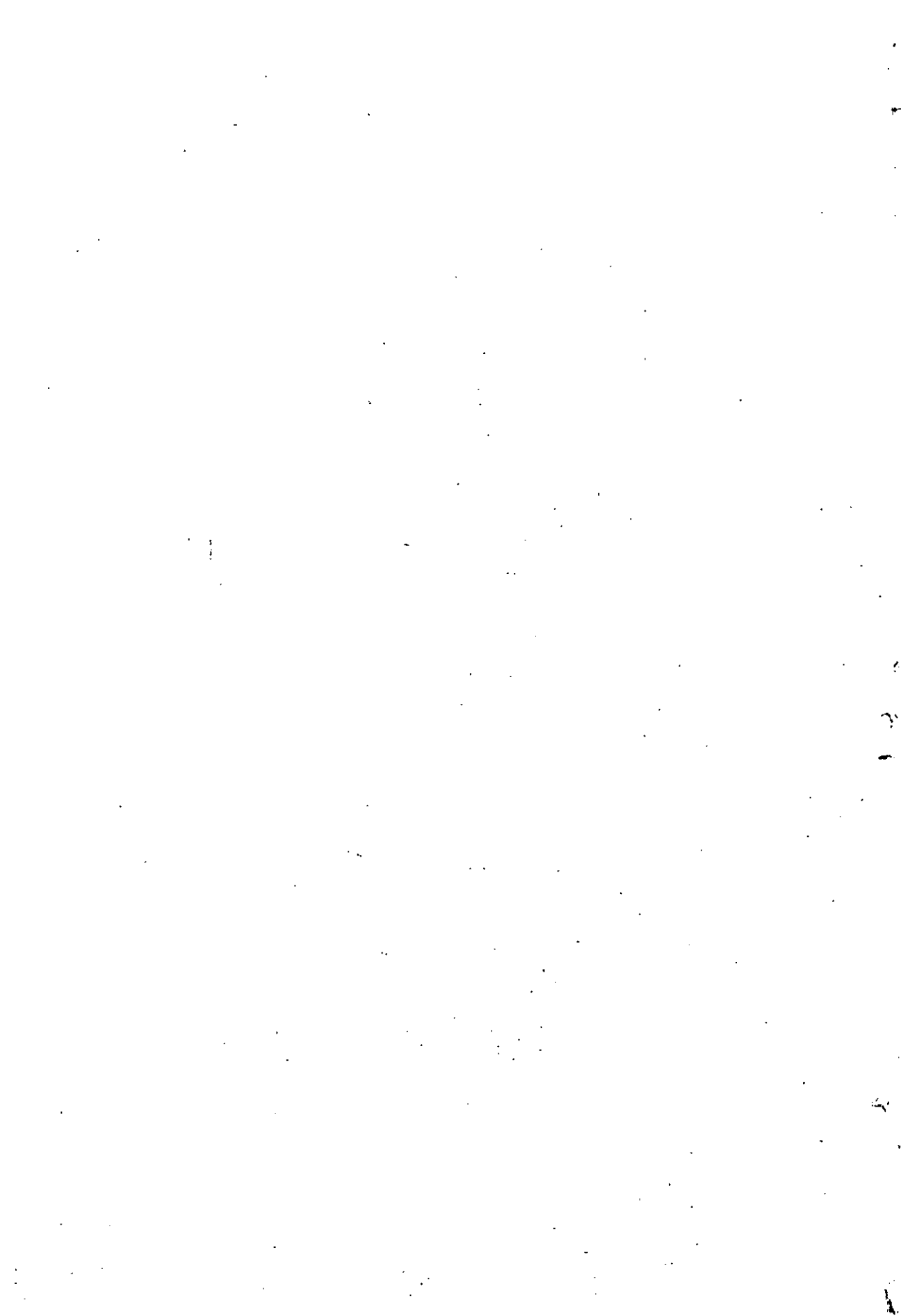
2010 A.D





بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
(إِنَّ هَذَا الْقُرْآنَ يَهْدِي لِلَّتِي هِيَ أَقْوَمُ
وَيُبَشِّرُ الْمُؤْمِنِينَ الَّذِينَ يَعْمَلُونَ
الصَّالِحَاتِ أَنَّ لَهُمْ أَجْرًا كَبِيرًا)

سورة الأسراء : آية 9



To my parents...

To my wife...



Glossary of Notation

<i>Abbreviation</i>	<i>Notation</i>	<i>Page</i>
OLS	Ordinary Least-Squares	2
L_1	Least absolute deviation	9
QMIP	Quadratic Mixed Integer Programming	12
MAD	Median of Absolute Deviations	22
ME	M-estimator	30
GM- estimator	Generalized M-estimator	30
Var	Variance of Vector	36
DFFITS	Difference In Fits	43
DFBETAS	Difference In b 's (based on internally studentized residual)	49
DFBETAS*	Difference In b 's (based on externally studentized residual)	53
HBP	High-Break Down Point	55
LMS	Least Median of Squares	55
LTS	Least Trimmed Sum of Squares	55
LTA	Least Trimmed Sum of Absolute Deviations	55
PTS	Penalized Trimmed Squares	56
RLS	Reweighted Least-Squares	60
MCD	Minimum Covariance Determinant	89
Det	Determinant	90
CLMS	Concentration Algorithm for Least Median of Squares	107
CLTS	Concentration Algorithm for Least Trimmed Sum of squares	107
CLTA	Concentration Algorithm for Least Trimmed Sum of Absolute Deviations	107
MBA	Median Ball Algorithm	112
MSE	Mean-Square Error	115
RE	Relative Efficiency	115



<i>List of Symbols</i>		<i>page</i>
n	Sample Size	4
$\xi_*(T, Z)$	Break-Down Point of an Estimator T at Sample Z	6
h_{ii}	Leverage of Hat Matrix	7
T	Transpose of a Vector or Matrix	7
H	Hat Matrix	7
p	Number of Parameters in the Regression Model	7
$\hat{Y}_{i(0)}$	Estimate of y Obtained Without the i^{th} Data point	8
F	The Basic Distribution	9
G	The Contaminating Distribution	9
λ	Contamination Fraction	9
u	Residuals of Regression Model	21
$\rho(u)$	Function of the Residuals	21
k	Tuning Parameter or Tuning(Robustness) Constant for Bounded-Influence Estimation Methods	23
Y	The Vector of Response Variable	21
X	Matrix of Independent Variables of Regression Model	21
B	Vector of Parameters of the Linear Regression Model	21
e	Random Error of Regression Model	21
$\hat{\sigma}$	Robust Estimate of Scale	22
σ	Scale Parameter	22
z	Standardized Residual	24
b 's	Parameters of the Multiple Linear Regression Model	26

W	M-Estimation Weight Function	26
ψ	The Derivative of the ρ -Function	31
w	Mallows's Weight Function	32
m	Robust Estimate of Mean	32
c	Robust Estimate of Variance-Covariance Matrix	32
α'	Robustness Constant for the Mallows Weight Function	32
b	Robustness Constant for the Mallows Weight Function	32
Σ	Variance-Covariance Matrix of a Population	32
M	Mean of a Population	32
χ	Function of the Standardized Residuals	34
Φ	Standard Normal Cumulative Distribution Function	35
ϕ	Standard Normal Density Function	35
v	Handschin's Weight Function	35
η	Compound Function of Standardized Residual and General Weight Function	38
w'	General Weight Function that depends on explanatory variables or residuals or both	38
W'	Staudte and Sheather Weight Function	40
v'	Welsch Weight Function.	42
G	Matrix of Weights for Generalized M-Estimators	46
U_j'	The Residual Vector x_j (the last column of the X-Matrix) is Regressed on the X- Matrix without x_j	50
$U_j'^T U_j'$	Residual Sum of Squares when x_j (the last column of the X- matrix) is Regressed on the X- Matrix without x_j).	52