

Acknowledgments

Completing a Ph. D. is, no doubt, a monumental task that requires faith, discipline, courage and, among other things, a good deal of help from external sources. To that end, I would like to express my gratitude to the following individuals who have played prominent roles in this journey. Many thanks to

1. The Appalachian College Association, the Faculty Scholars Program of the University of Kentucky, and the Southern Baptist Foundation for funding my pursuits in Statistics; both at the M.S. (University of Kentucky) and Ph. D. (Virginia Polytechnic Institute and State University) levels.
2. Bluefield College for allowing me leave time to conduct these studies and for being patient.
3. The excellent staff at Virginia Polytechnic Institute and State University. Many thanks to Betty Higginbotham, Linda Sewell, Linda Breeding, Dinah Easterly, Dianne Santolla, Michele Marini, and Betsy Trenor.
4. Dr. M. M. Ali and Dr. William Griffith at the University of Kentucky, for your friendship and direction in earlier years.
5. My committee members at Virginia Polytechnic Institute and State University; Dr. Christine Anderson-Cook, Dr. Clint W. Coakley, Dr. Eric P. Smith and Dr. George W. Terrell. I appreciate each of you and the guidance you have provided.
6. My Ph. D. advisor Dr. Jeffrey B. Birch. You are the consummate professional. I cannot begin to tell you how much I appreciate your guidance, foresight, patience and insight. I look forward to continuing our research in the future.
7. My parents John A. and Craig Williams Starnes. Thank you for your logistical, spiritual, and emotional support throughout my life. I love you.
8. My wife Mary Moler Starnes, and my children Elizabeth N. Starnes and B. Enoch Starnes. Your patience and encouragement are not lost on me. It's over and daddy's home again. I love you.

Finally (and most importantly) I firmly believe that in His Love, God has ordained this doctorate. I have done nothing in this process except that which God has foreordained. Jude 25: "To the only God our Savior be glory, majesty, power and authority, through Jesus Christ our Lord, before all ages, now, and forevermore. Amen."

Table of Contents

Chapter/Part	Topic	Page
Chapter 1	Introduction and Motivation	1
Chapter 2	A Review of Parametric and Nonparametric Regression	5
Part 2a	Review of Parametric Regression	5
Part 2b	Review of Nonparametric Regression	8
Part 2c	Review of Model Robust Regression	11
Chapter 3	Asymptotic Results for MRR1	15
Part 3a	Basic MRR1 Asymptotics	18
Part 3b	Asymptotic Results for MRR1 using PRESS	28
Part 3c	Asymptotic Results for MRR1 using PRESS*(and PRESS**)	37
Appendix 3a	Proofs for Part 3a	45
Appendix 3b	Proofs for Part 3b	47
Appendix 3c	Proofs for Part 3c	51
Chapter 4	Asymptotic Results for MRR2	53
Part 4a	Basic MRR2 Asymptotics	55
Part 4b	Asymptotic Results for MRR2 using PRESS	64
Appendix 4a	Proofs for Part 4a	73
Appendix 4b	Proofs for Part 4b	82
Chapter 5	Asymptotic Results for Semiparametric Quantal Regression	85
Part 5a	Quantal Regression Asymptotic Preliminaries	86
Part 5b	Asymptotic Results for MRR1 Quantal Regression	97
Appendix 5a	Proofs for Part 5a	105
Appendix 5b	Proofs for Part 5b	113
Chapter 6	Summary and Future Work	119
Bibliography		122
Vita		125