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Modeling Fractional Outcomes with SAS[®]

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Abstract

The generalized SAS[®] Ordinal Logistic Regression regression with Gaussian distributional assumption has been the top choice to model fractional outcomes in many business problems. However, it is commonly found in business Gaussian distribution fit is especially suitable in the (0, 1) range. In this paper, several modeling techniques for fractional outcomes with their implementations in SAS are discussed through a case study on customer in modeling fractional budget ratio of businesses. The purpose of this paper is to provide a relatively comprehensive survey of how to model fractional outcomes in the SAS and comparing and contrasting the model assumptions.

Keywords

Fractional outcomes, Total model, SAS, Multinomial total Squared regression, Fractional logit model, Beta regression, Dirichlet regression, Poisson counts.

1. Introduction

In the financial services industry, we often observed business outcomes in model fractional outcomes in the range of (0, 1). For instance, in the context of credit risk, SAS[®] Ordinal Logistic Regression measures the probability of losses not recovered from a default borrower during the collection process, which is observed in the closed interval (0, 1). Another example is the corporate financial leverage ratio represented by the long term debt as a proportion of the combined fixed plus long term debt and the equity.

Although several research in statistical models for fractional outcomes have been published during the past years, there is still no general agreement on either the distributional assumption or the modeling process. An interesting but somewhat tricky study is that the simple OLS regression with Gaussian distributional assumption has achieved the best predictive performance model fractional outcomes due to the simplicity. However, the agreement with OLS regression suffers from a couple of important flaws. First and the most important of all, fractional outcomes in the (0, 1) interval are not defined on the whole real line and therefore shouldn't be considered normally distributed. Moreover, a statistical counter-indicator of fractional outcomes is that the observed is not independent of the mean. For instance, the leverage ratios on the most sophisticated company groups of (0, 1), which is implying that a firm of

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Table of Contents Modeling Fractional Outcomes With Sas

1. Understanding the eBook Modeling Fractional Outcomes With Sas
 - The Rise of Digital Reading Modeling Fractional Outcomes With Sas
 - Advantages of eBooks Over Traditional Books
2. Identifying Modeling Fractional Outcomes With Sas
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Modeling Fractional Outcomes With Sas
 - User-Friendly Interface
4. Exploring eBook Recommendations from Modeling Fractional Outcomes With Sas
 - Personalized Recommendations
 - Modeling Fractional Outcomes With Sas User Reviews and Ratings
 - Modeling Fractional Outcomes With Sas and Bestseller Lists
5. Accessing Modeling Fractional Outcomes With Sas Free and Paid eBooks
 - Modeling Fractional Outcomes With Sas Public Domain eBooks

- Modeling Fractional Outcomes With Sas eBook Subscription Services
- Modeling Fractional Outcomes With Sas Budget-Friendly Options
- 6. Navigating Modeling Fractional Outcomes With Sas eBook Formats
 - ePub, PDF, MOBI, and More
 - Modeling Fractional Outcomes With Sas Compatibility with Devices
 - Modeling Fractional Outcomes With Sas Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Modeling Fractional Outcomes With Sas
 - Highlighting and Note-Taking Modeling Fractional Outcomes With Sas
 - Interactive Elements Modeling Fractional Outcomes With Sas
- 8. Staying Engaged with Modeling Fractional Outcomes With Sas
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Modeling Fractional Outcomes With Sas
- 9. Balancing eBooks and Physical Books Modeling Fractional Outcomes With Sas
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Modeling Fractional Outcomes With Sas
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Modeling Fractional Outcomes With Sas
 - Setting Reading Goals Modeling Fractional Outcomes With Sas
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Modeling Fractional Outcomes With Sas
 - Fact-Checking eBook Content of Modeling Fractional Outcomes With Sas
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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