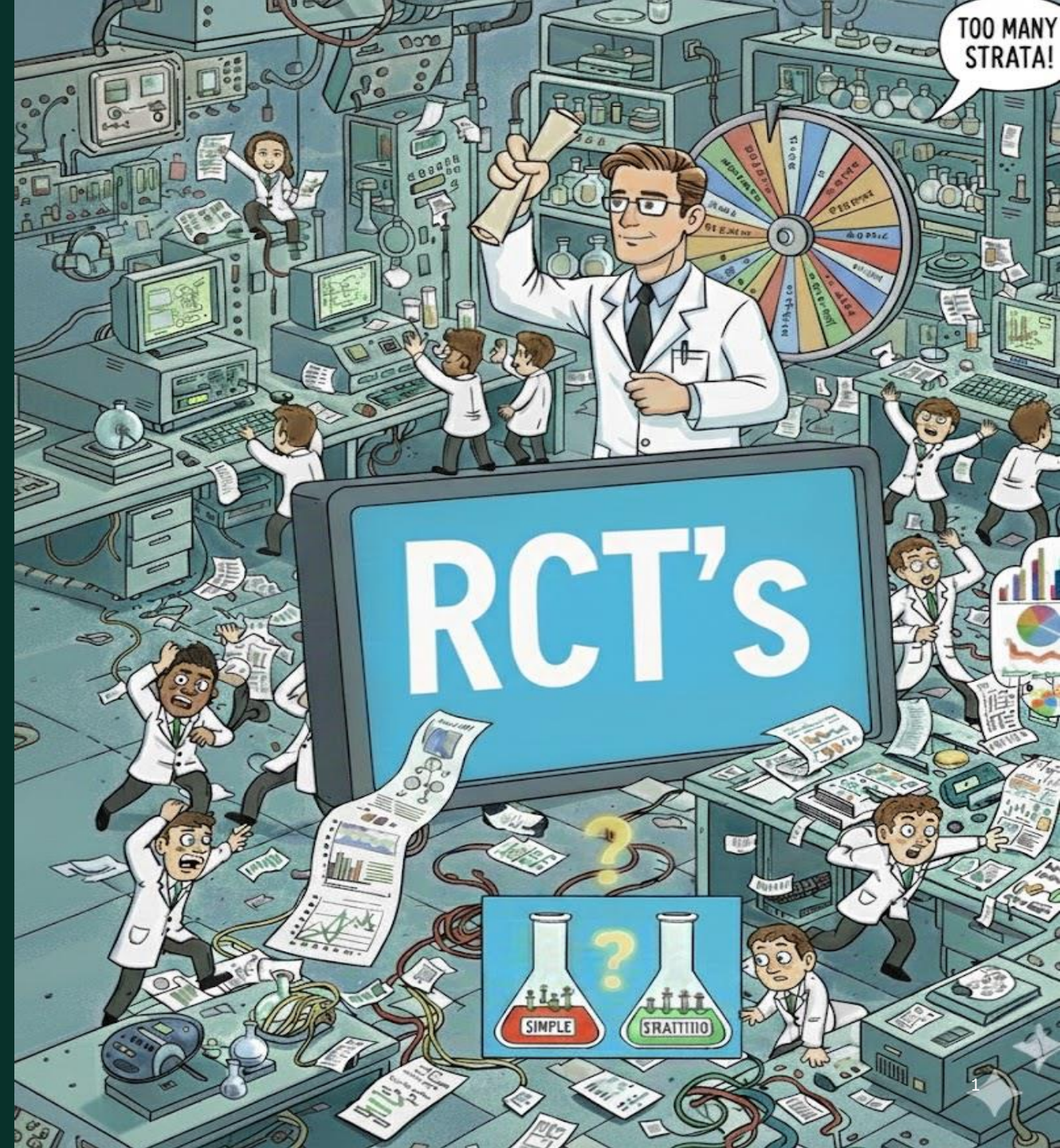


Is There Really Any Benefit to Stratified Randomisation in Practice?

Pavankumar Bhagat | 23MAR2026|PHUSE US Connect 2026 [AS07] – Austin, TX



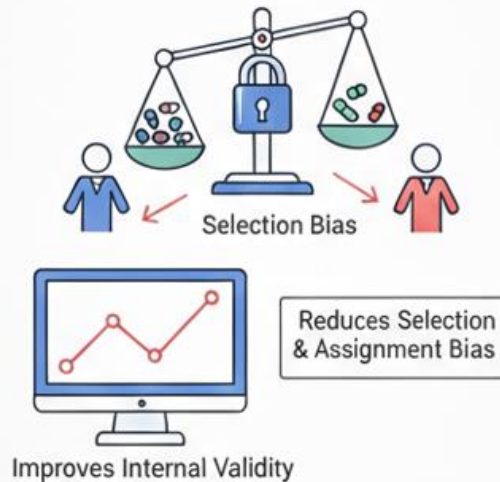
Disclaimer

- The following slides include statements and approaches that represent my personal perspective and may not necessarily reflect the official positions or recommendations of Boehringer Ingelheim.
- It is important to acknowledge that the subject matter allows for a variety of valid approaches, and the methods I present are not intended to be extensive.
- Where applicable, I have indicated the locations of official sources. The primary focus of this presentation, however, is a description of my past and current research.

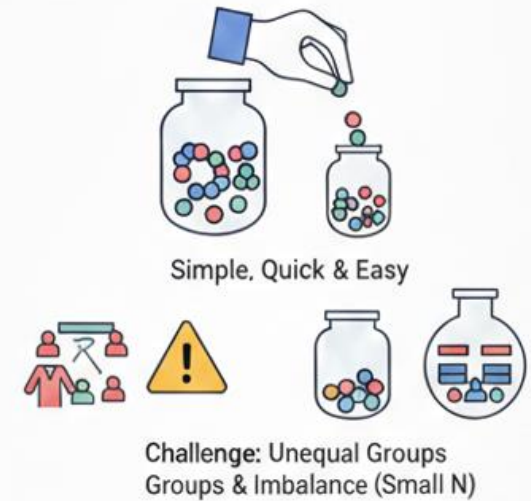
Motivation

- RCT's are key part of the modern clinical trial design.
- while stratified randomization is common, with more than 60% of trials using at least one stratification factor [1], only a few trials, around 31%, have appropriately adjusted the covariates [1]

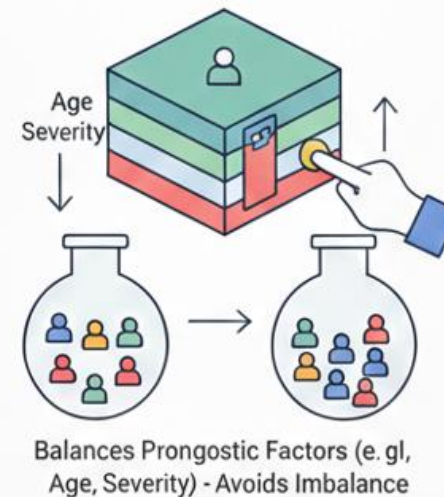
1. The Gold Standard & Bias Reduction



2. Simple Randomization: The Basics



3. Stratified Randomization: the Solution



4. The Ongoing Debate & Research Question



Simulation Study

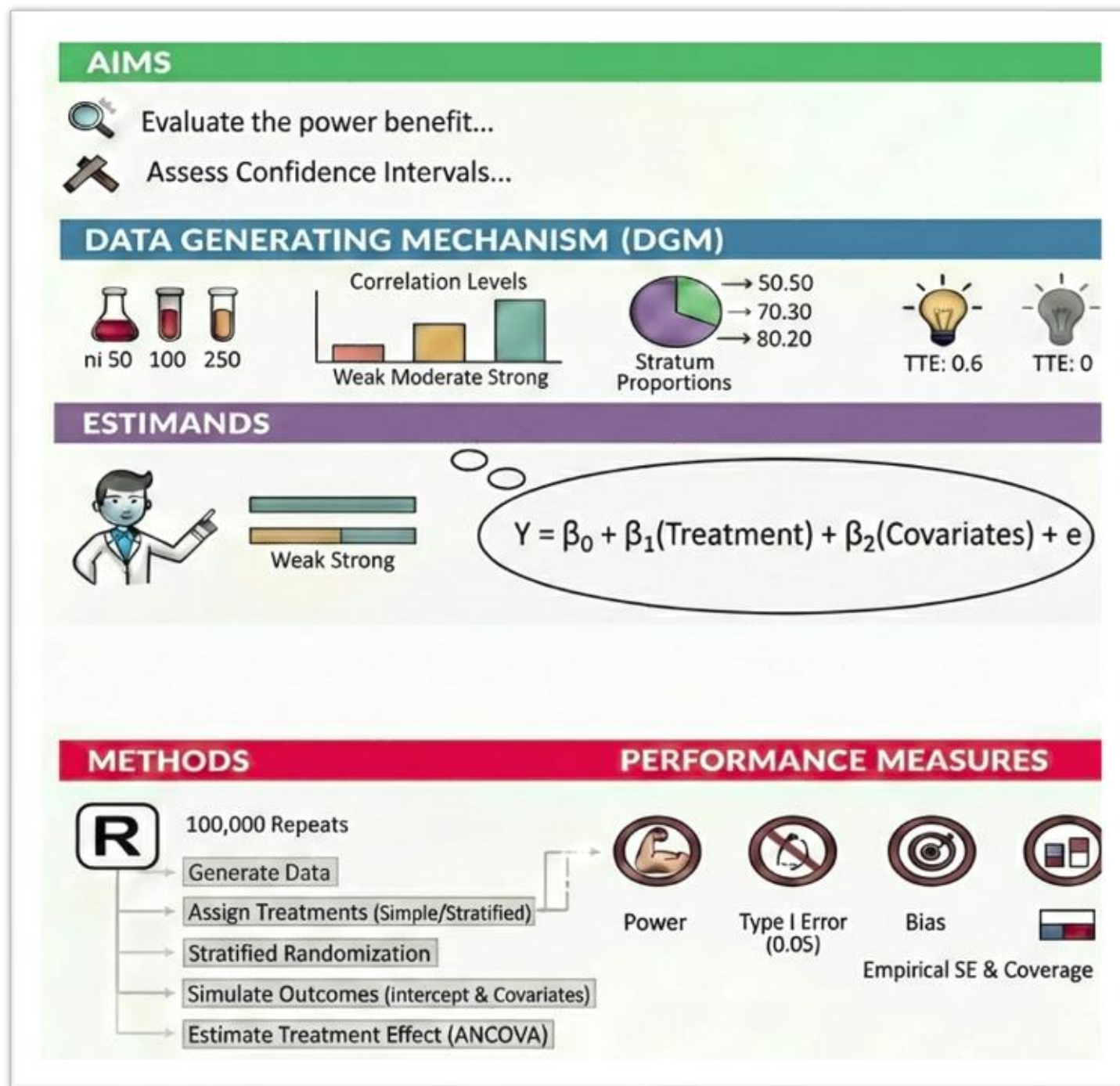
SIMULATION STUDY: CONTINUOUS OUTCOME!



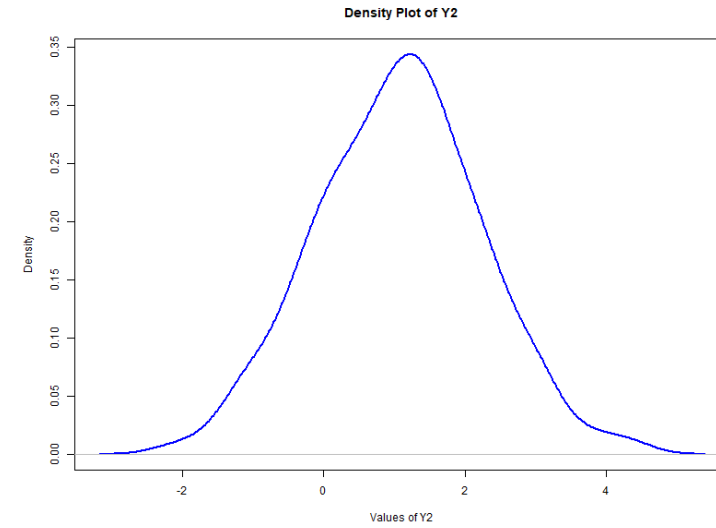
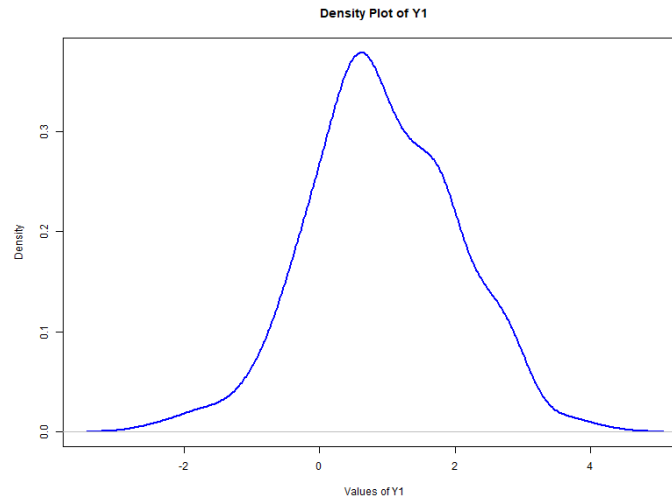
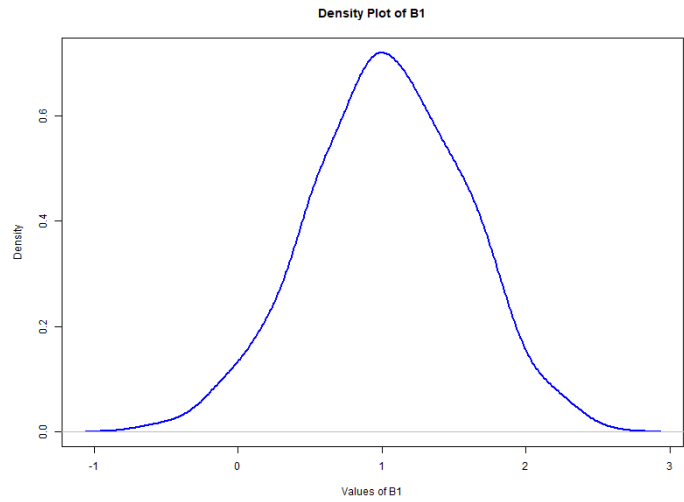
Simulation Study – ADEMP structure

➤ Stratification factor variable(B_stratify) generated with 2 levels based on B1 and threshold of 1

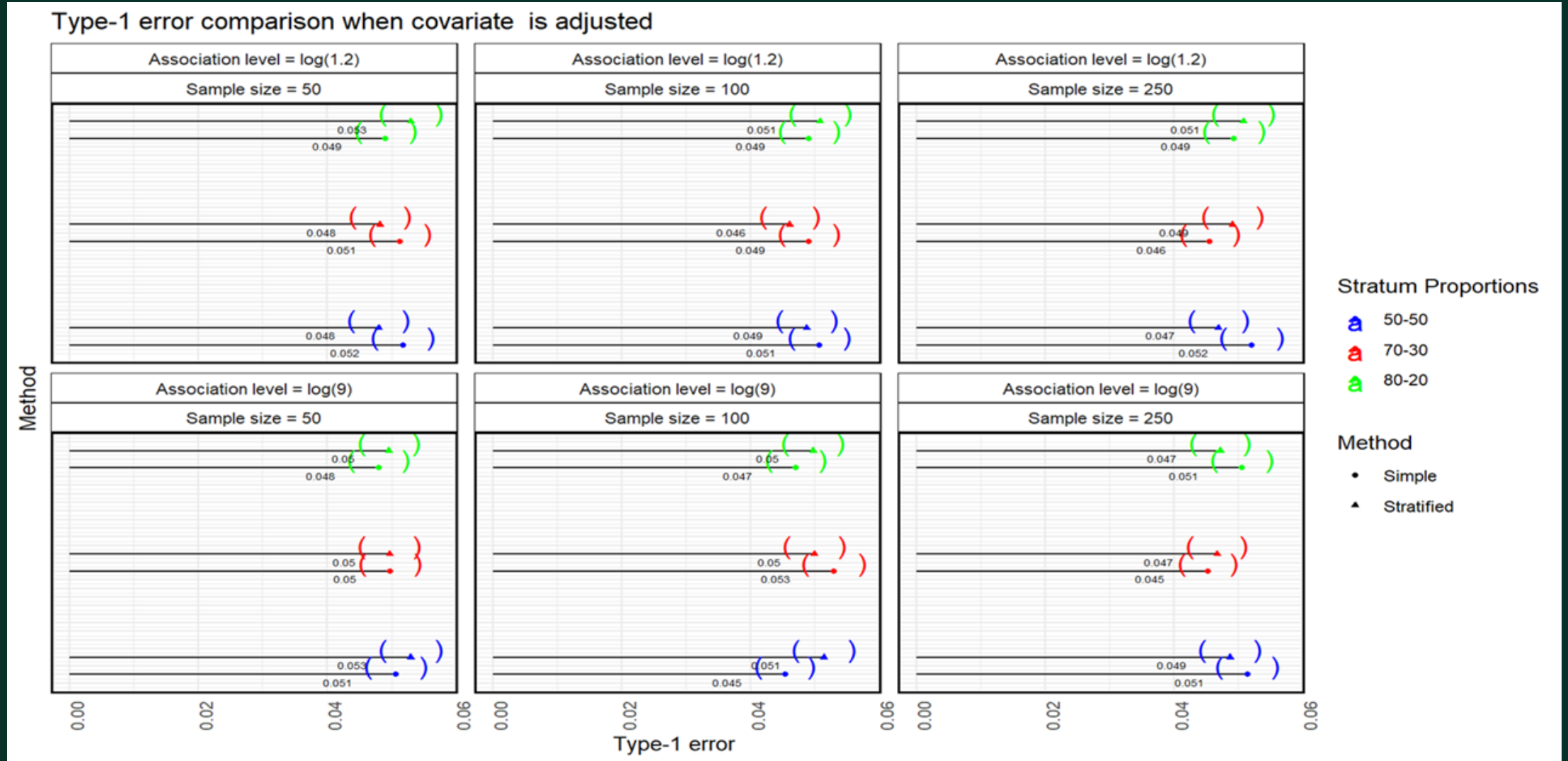
➤ Treatment variable(X2) was generated using block randomisation and strata factor



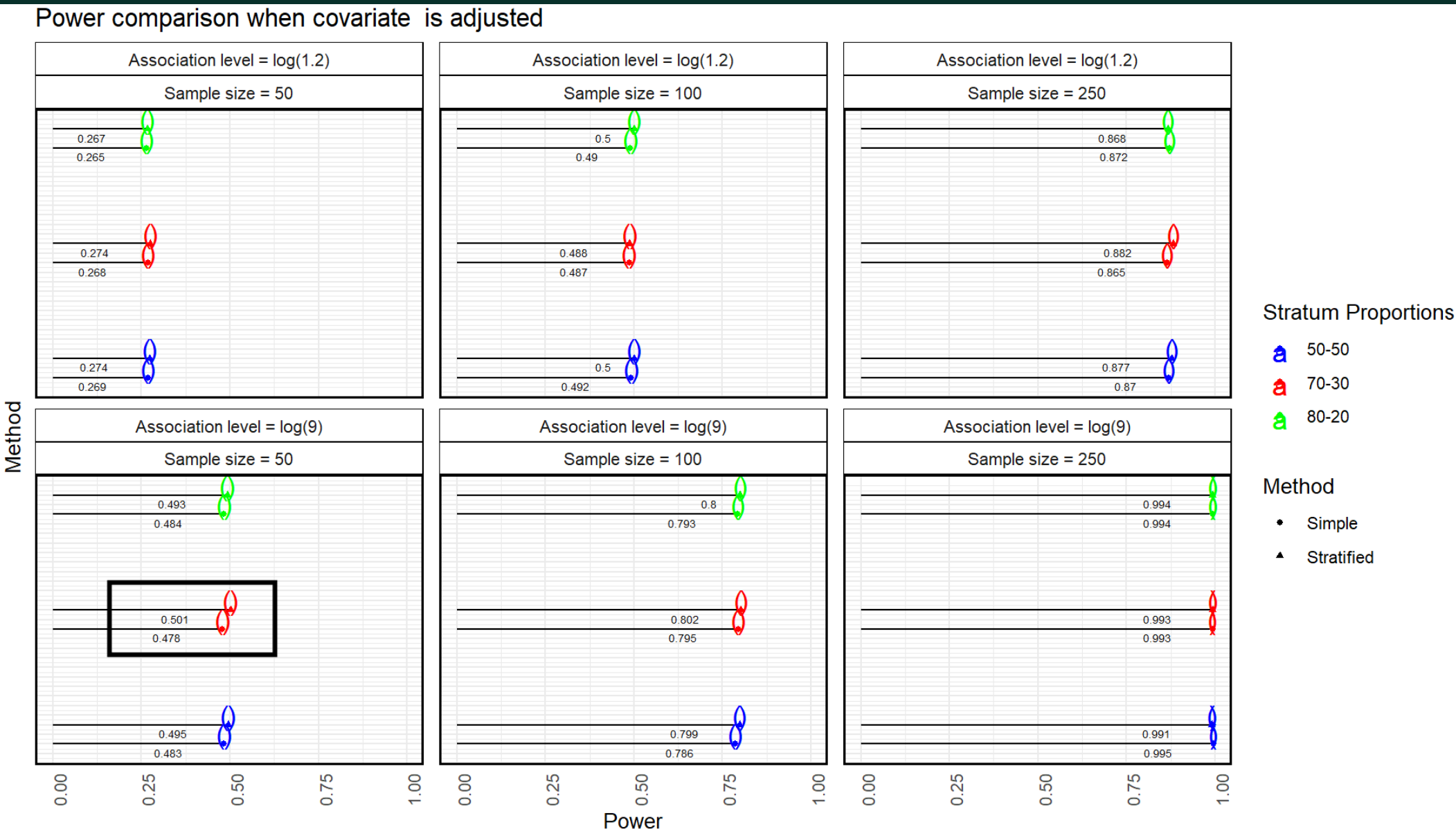
Analysis



Results - Type 1- error

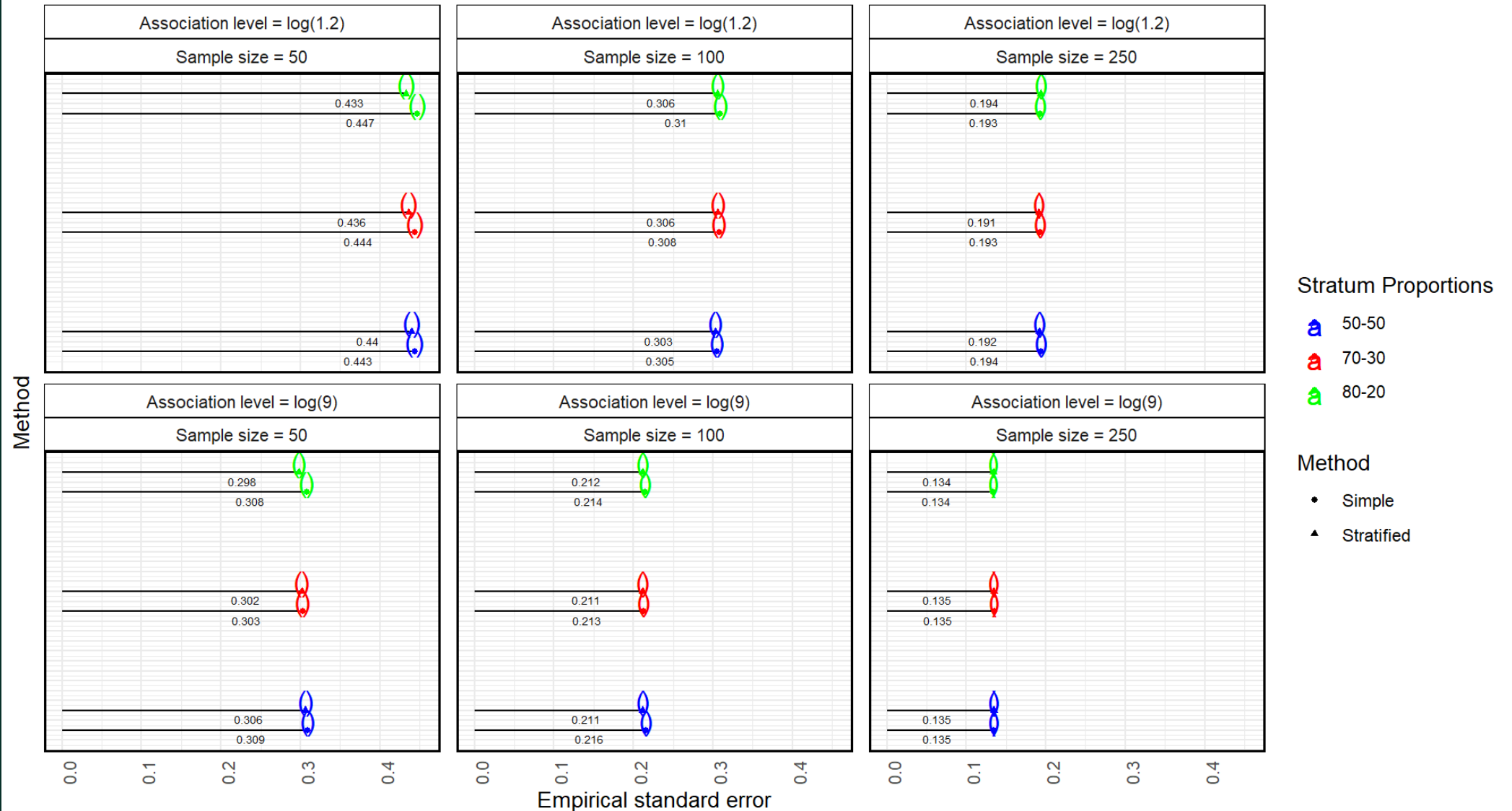


Results - Power



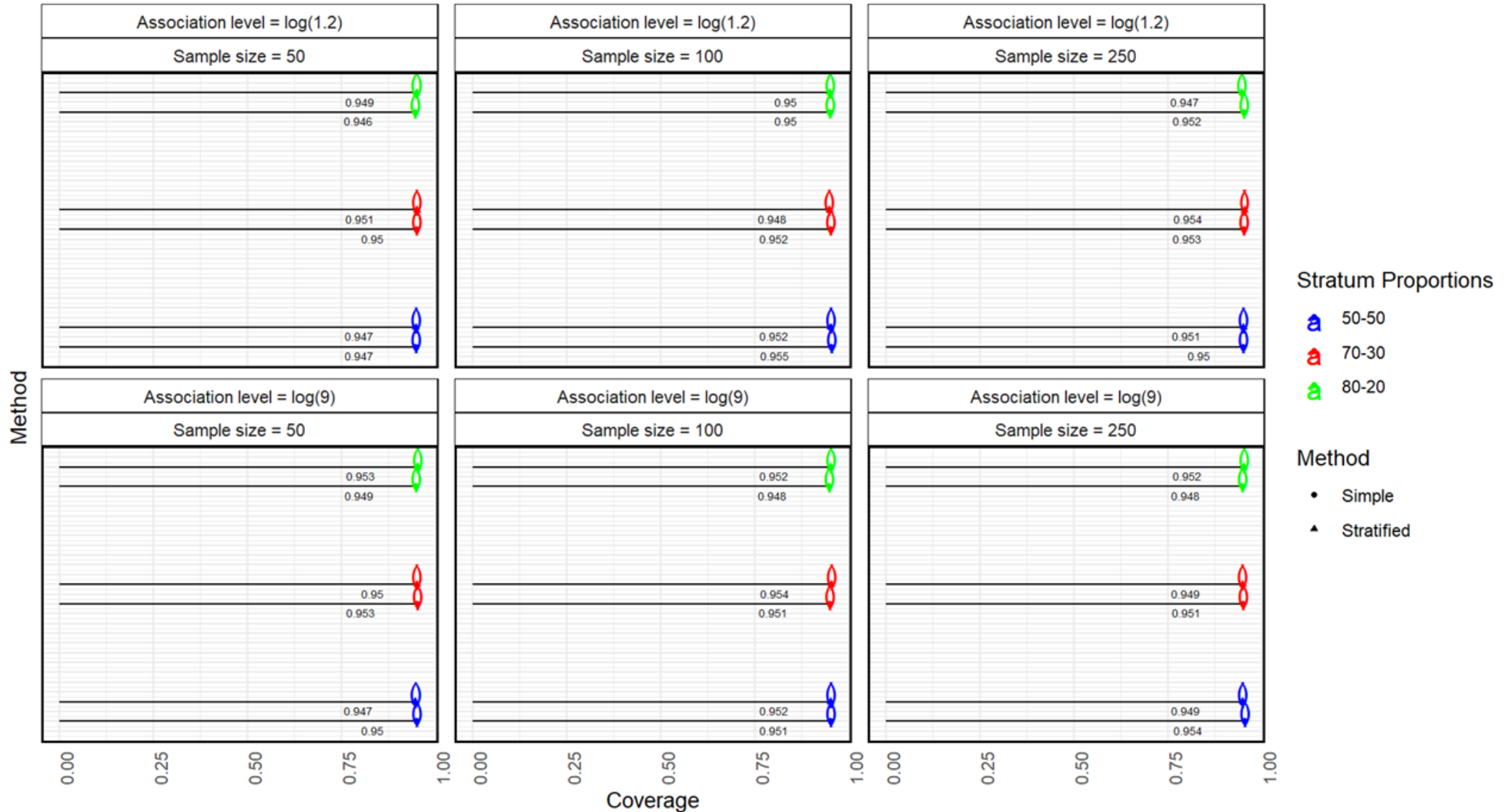
Results - Empirical standard error

Empirical standard error comparison when covariate is adjusted

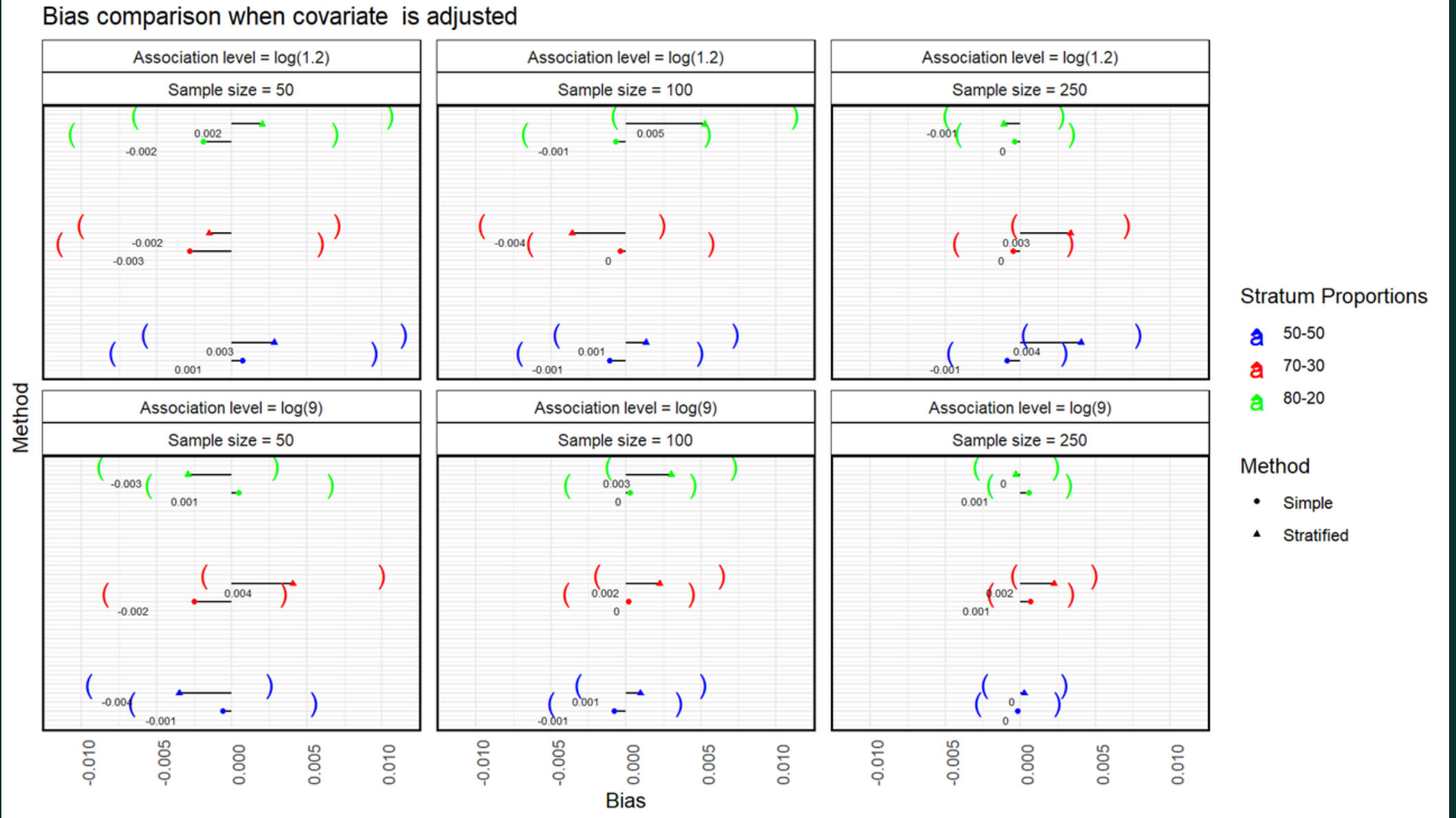


Results - Coverage

Coverage comparison when covariate is adjusted



Results - Bias



Conclusions



Summary:



No meaningful benefit of stratified randomisation over simple randomisation with covariate adjustment - especially in large trials.



Stratified randomisation demonstrates theoretical advantages in balance; however, the complexity may not translate to improved performance in all settings.



Future Directions:



Exploration of benefits with different outcomes(binary/time to event)

Recommendations while using stratified randomization

General recommendation is that, if we stratify any factors during randomisation, then we should adjust for those during the analysis.

FDA guidance recommends the emphasis on pre-specifying co-variate adjustment procedures for reliable clinical trial results.

How many strata factors we should use? : number should be less than $n/(B*4)$

If the strata factors are more (4 or 6) it could decrease the power when compared to strata factors with 1 or 2

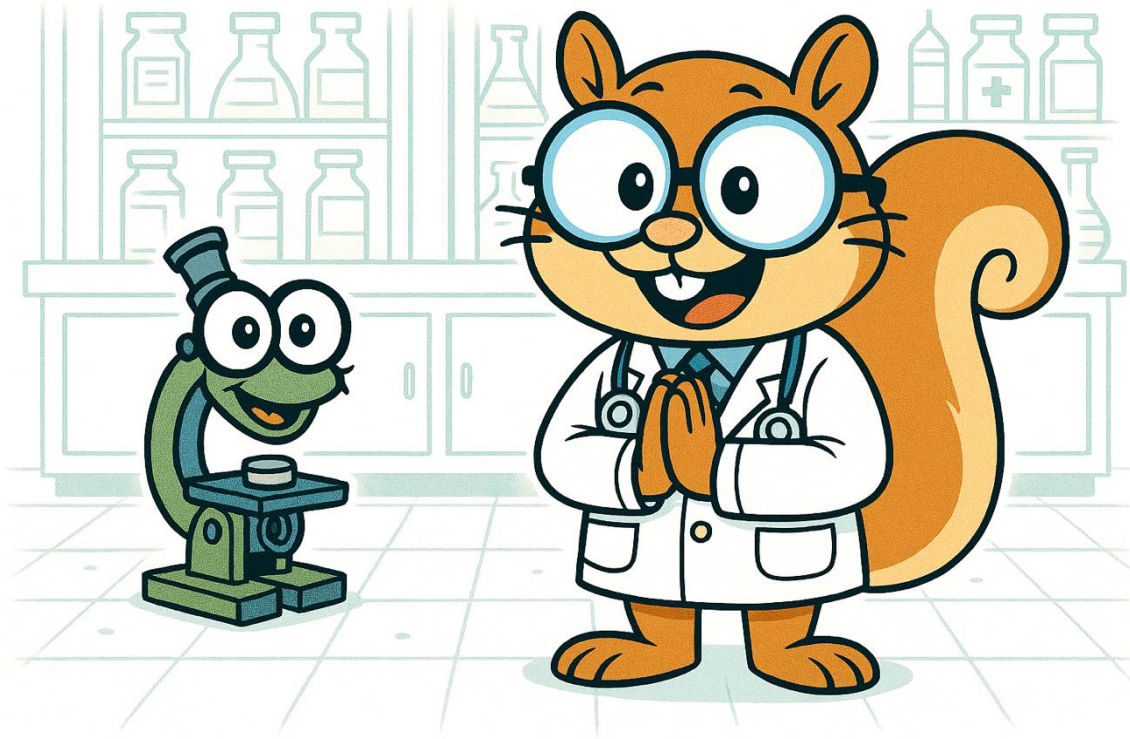
It is important to recognize that if the baseline covariate is used to stratify the randomization, then in the analysis stage model should include the patient's actual baseline and not the stratum assignment of the baseline variable [EMA guideline]

Acknowledgements and References

Special thanks to my supervisor from University of Manchester “Dr. Jack Wilkinson” for guidance and supervision during this simulation study.

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- 4. B. F. e. a. Anna Moseley, “How many stratification factors are reasonable and can there be too many? evaluation of analysis strategies in the context of a randomized phase 2 trial in acute myeloid leukemia within the myelomatch platform,” ACUTE MYELOID LEUKEMIAS: CLINICAL AND EPIDEMIOLOGICAL, vol. 140, no. 1, pp. 98–108, 2022 .
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- 6. Morris, T. P., & White, I. R. (2019). Using simulation studies to evaluate statistical methods.

Thank you for your attention :)



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