

**Inferences and Effect Sizes for Direct, Indirect, and Total Effects in Continuous-Time
Mediation Models (Supplementary Materials)**

Ivan Jacob Agaloos Pesigan¹, Michael A. Russell^{1, 2}, and Sy-Miin Chow³

¹Edna Bennett Pierce Prevention Research Center, The Pennsylvania State University

²Department of Biobehavioral Health, The Pennsylvania State University

³Department of Human Development and Family Studies, The Pennsylvania State University

Author Note

Ivan Jacob Agaloos Pesigan  <https://orcid.org/0000-0003-4818-8420>; Michael A. Russell  <https://orcid.org/0000-0002-3956-604X>; Sy-Miin Chow  <https://orcid.org/0000-0003-1938-027X>.

This research was made possible by the Prevention and Methodology Training Program (PAMT) funded by a T32 training grant (T32 DA017629 Multiple Principal Investigators: Jennifer Maggs & Stephanie Lanza) from the National Institute on Drug Abuse (NIDA), the National Institutes of Health Intensive Longitudinal Health Behavior Cooperative Agreement Program (U24AA027684), National Science Foundation (Grant DUE-2417294), the National Center for Advancing Translational Sciences (UL1TR002014-06), and the National Institute of Diabetes, Digestive & Kidney Diseases (U01DK135126).

Computations for this research were performed on the Pennsylvania State University's Institute for Computational and Data Sciences' Roar supercomputer using SLURM for job scheduling (Yoo et al., 2003), GNU Parallel to run the simulations in parallel (Tange, 2021), and Apptainer to ensure a reproducible software stack (Kurtzer et al., 2017, 2021).

Some of the data and ideas in the manuscript were presented at the Society for Prevention Research Conference in May 2024 and the International Meeting of Psychometric Society in July 2024.

Correspondence concerning this article should be addressed to Ivan Jacob Agaloos Pesigan, Edna Bennett Pierce Prevention Research Center, College of Health and Human Development, The Pennsylvania State University, 320 Biobehavioral Health Building, University Park, PA 16802 or by email (ijapesigan@psu.edu).

**Inferences and Effect Sizes for Direct, Indirect, and Total Effects in Continuous-Time
Mediation Models (Supplementary Materials)**

Links

Research Compendium

The data and materials for this study are available on OSF (<https://osf.io/qwnmf>) and GitHub (<https://github.com/jeksterslab/manCTMed>, <https://jeksterslab.github.io/manCTMed/index.html>).

cTMed R Package

Source code and documentation for the **cTMed** R package are available on GitHub (<https://github.com/jeksterslab/cTMed>, <https://jeksterslab.github.io/cTMed/index.html>).

Illustration 1

<https://jeksterslab.github.io/manCTMed/articles/fig-example-1.html>

Illustration 2

<https://jeksterslab.github.io/manCTMed/articles/fig-example-2.html>

Illustration 3

<https://jeksterslab.github.io/manCTMed/articles/fig-example-3.html>

Single Replication from the Simulation Study

<https://jeksterslab.github.io/manCTMed/articles/replication.html>

Containers for Reproducibility

<https://jeksterslab.github.io/manCTMed/articles/containers.html>

Figures

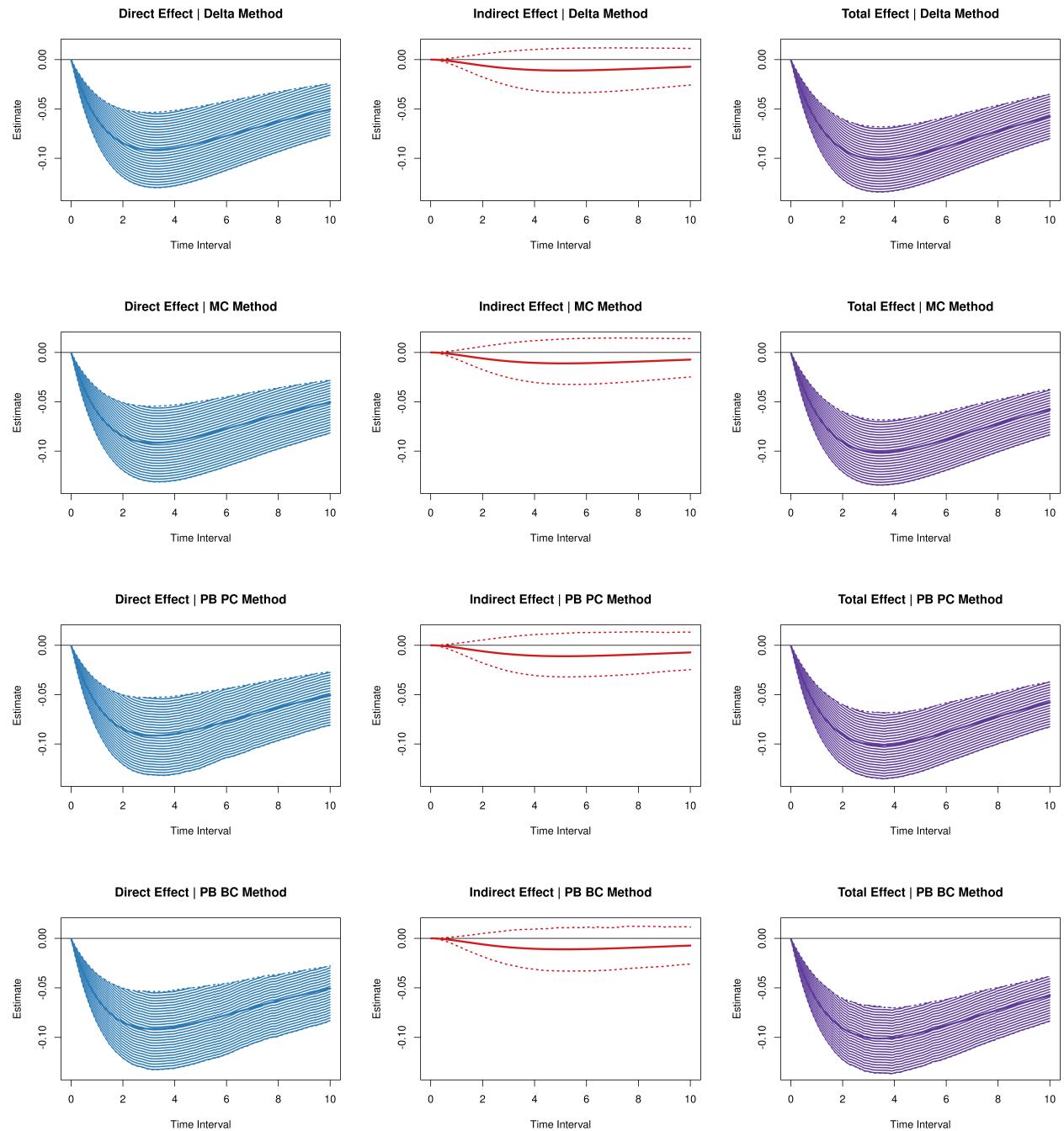
List of Figures

1	Regions of Significance for the Direct, Indirect, and Total Effects (Conflict → Knowledge → Competence)	4
2	Regions of Significance for the Standardized Direct, Indirect, and Total Effects (Conflict → Knowledge → Competence)	5
3	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Moderate Coupling Unstandardized)	6
4	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Moderate Coupling Unstandardized)	7
5	Monte Carlo Simulation Study Statistical Power (Moderate Coupling Unstandardized)	8
6	Monte Carlo Simulation Study Type I Error Rate (Moderate Coupling Unstandardized)	9

7	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Moderate Coupling Standardized)	10
8	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Moderate Coupling Standardized)	11
9	Monte Carlo Simulation Study Statistical Power (Moderate Coupling Standardized)	12
10	Monte Carlo Simulation Study Type I Error Rate (Moderate Coupling Standardized)	13
11	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Strong Coupling Unstandardized)	14
12	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Strong Coupling Unstandardized)	15
13	Monte Carlo Simulation Study Statistical Power (Strong Coupling Unstandardized)	16
14	Monte Carlo Simulation Study Type I Error Rate (Strong Coupling Unstandardized)	17
15	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Strong Coupling Standardized)	18
16	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Strong Coupling Standardized)	19
17	Monte Carlo Simulation Study Statistical Power (Strong Coupling Standardized)	20
18	Monte Carlo Simulation Study Type I Error Rate (Strong Coupling Standardized)	21
19	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Weak Coupling Unstandardized)	22
20	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Weak Coupling Unstandardized)	23
21	Monte Carlo Simulation Study Statistical Power (Weak Coupling Unstandardized)	24
22	Monte Carlo Simulation Study Type I Error Rate (Weak Coupling Unstandardized)	25
23	Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 Weak Coupling Standardized)	26
24	Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 Weak Coupling Standardized)	27
25	Monte Carlo Simulation Study Statistical Power (Weak Coupling Standardized)	28
26	Monte Carlo Simulation Study Type I Error Rate (Weak Coupling Standardized)	29

Figure 1

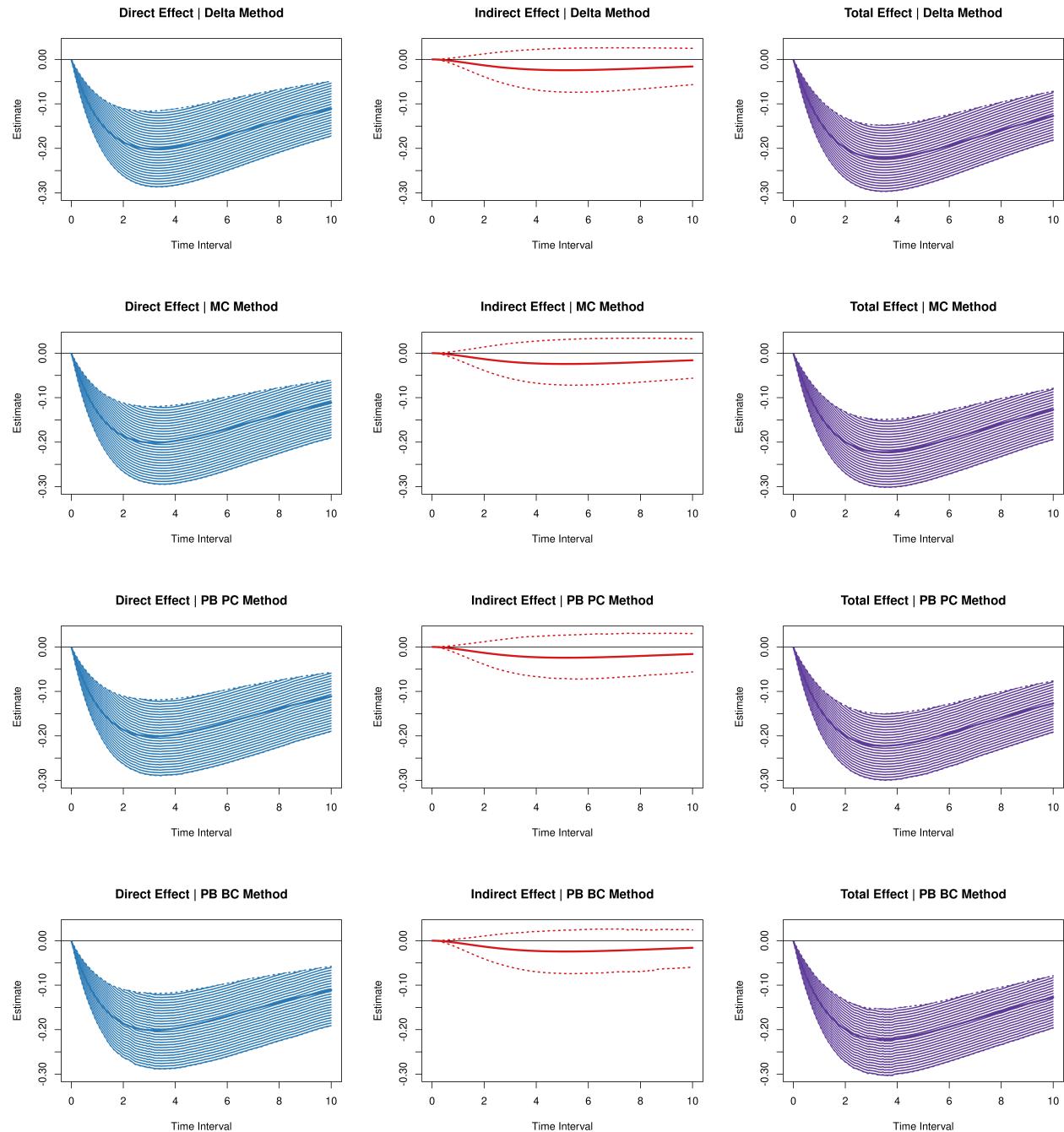
Regions of Significance for the Direct, Indirect, and Total Effects (Conflict → Knowledge → Competence)



Note: The shaded areas represent regions of significance, that is, instances where the 95% CIs did not contain zero for a given time interval.

Figure 2

Regions of Significance for the Standardized Direct, Indirect, and Total Effects (Conflict → Knowledge → Competence)



Note: The shaded areas represent regions of significance, that is, instances where the 95% CIs did not contain zero for a given time interval.

Figure 3
Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 / Moderate Coupling / Unstandardized)

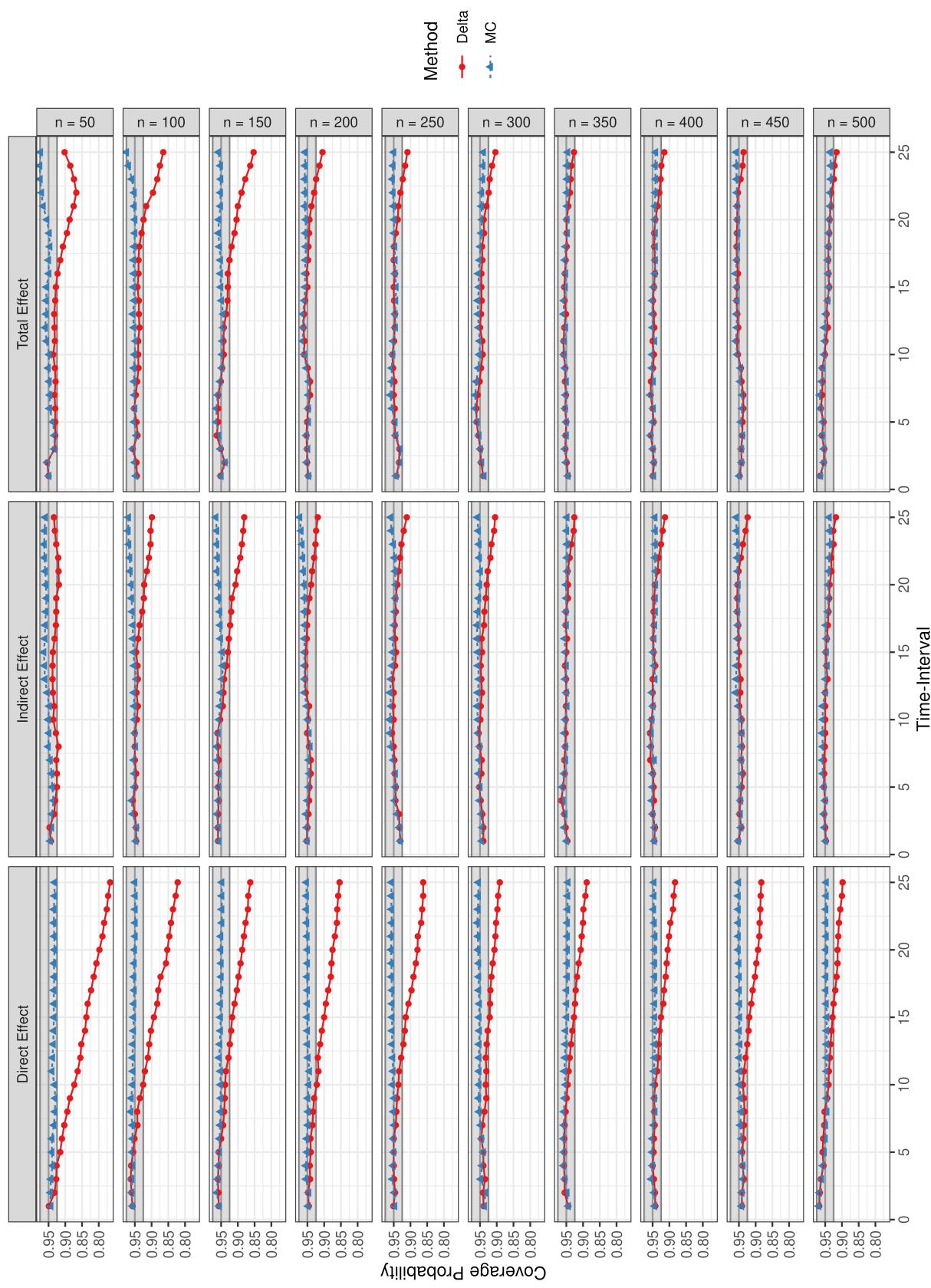
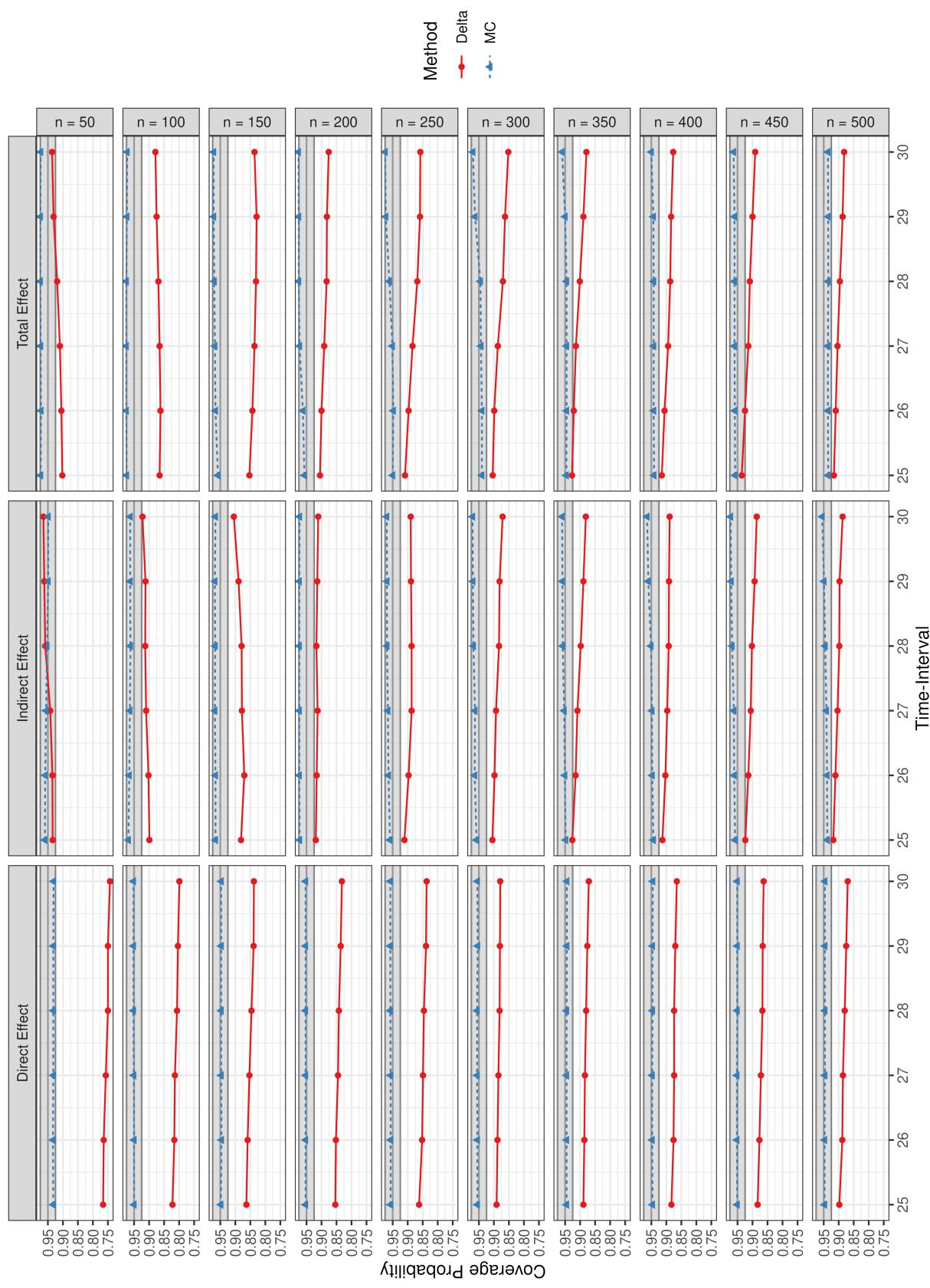
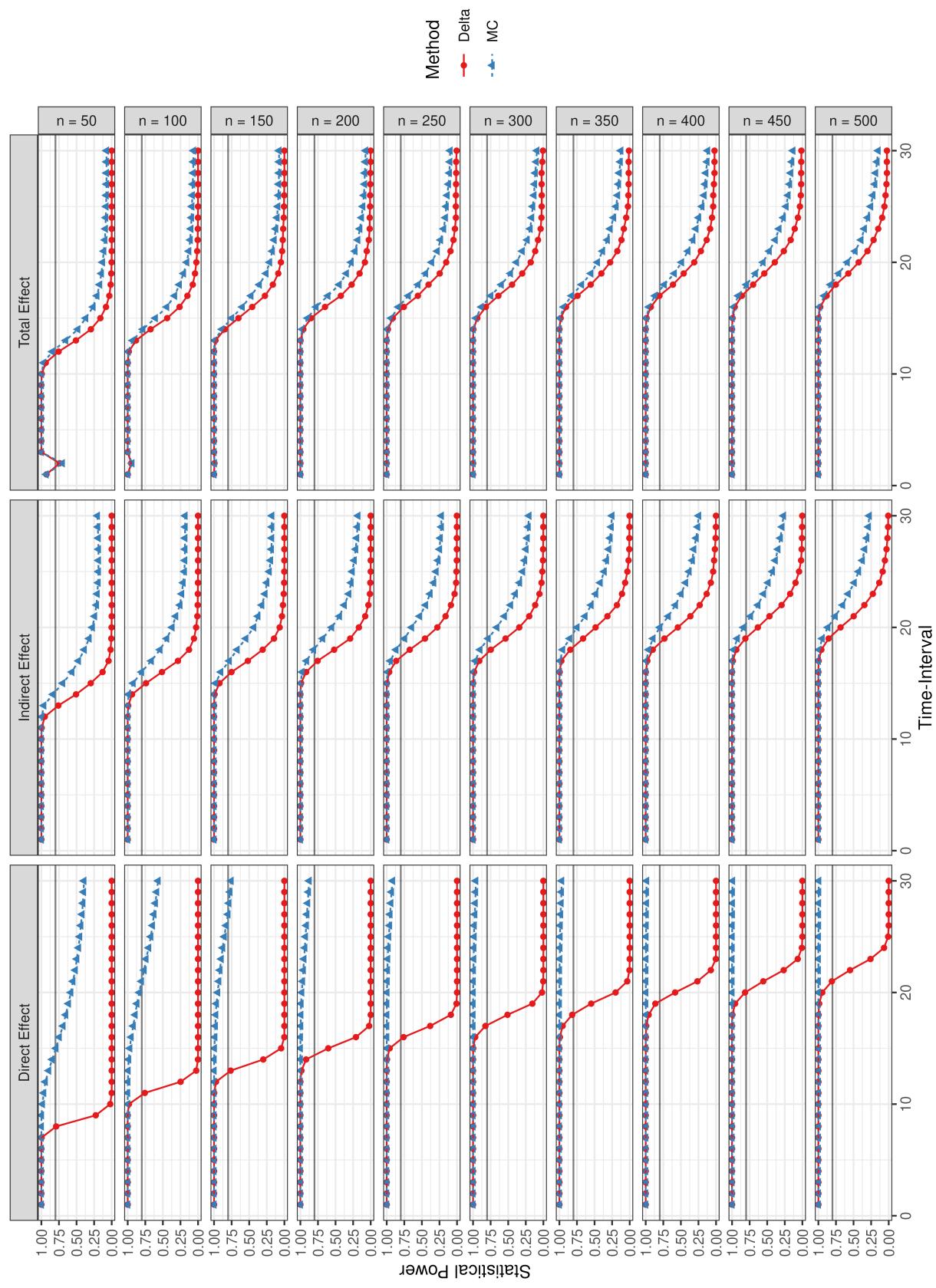


Figure 4
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Moderate Coupling / Unstandardized)





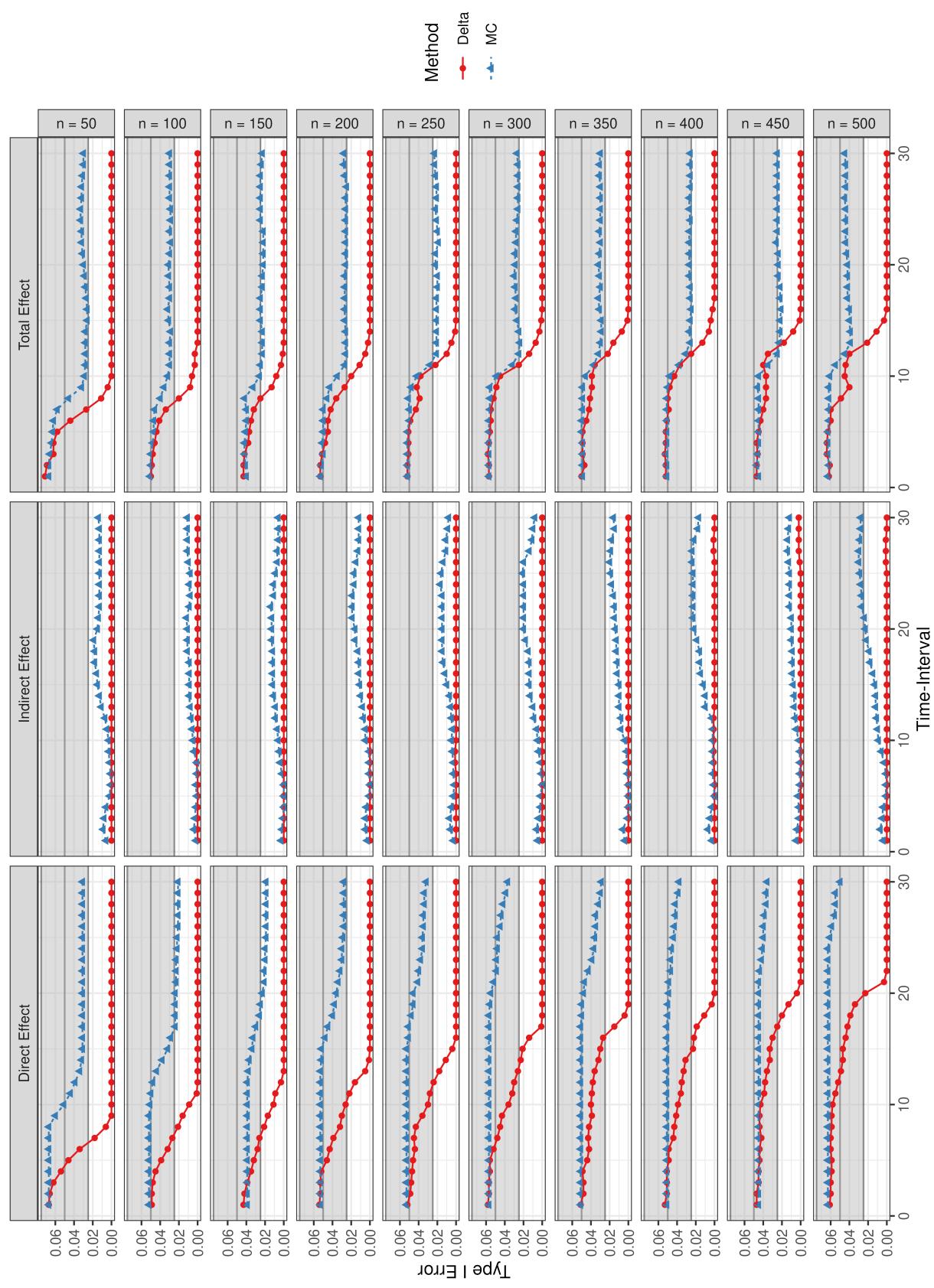


Figure 7
Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 / Moderate Coupling / Standardized)

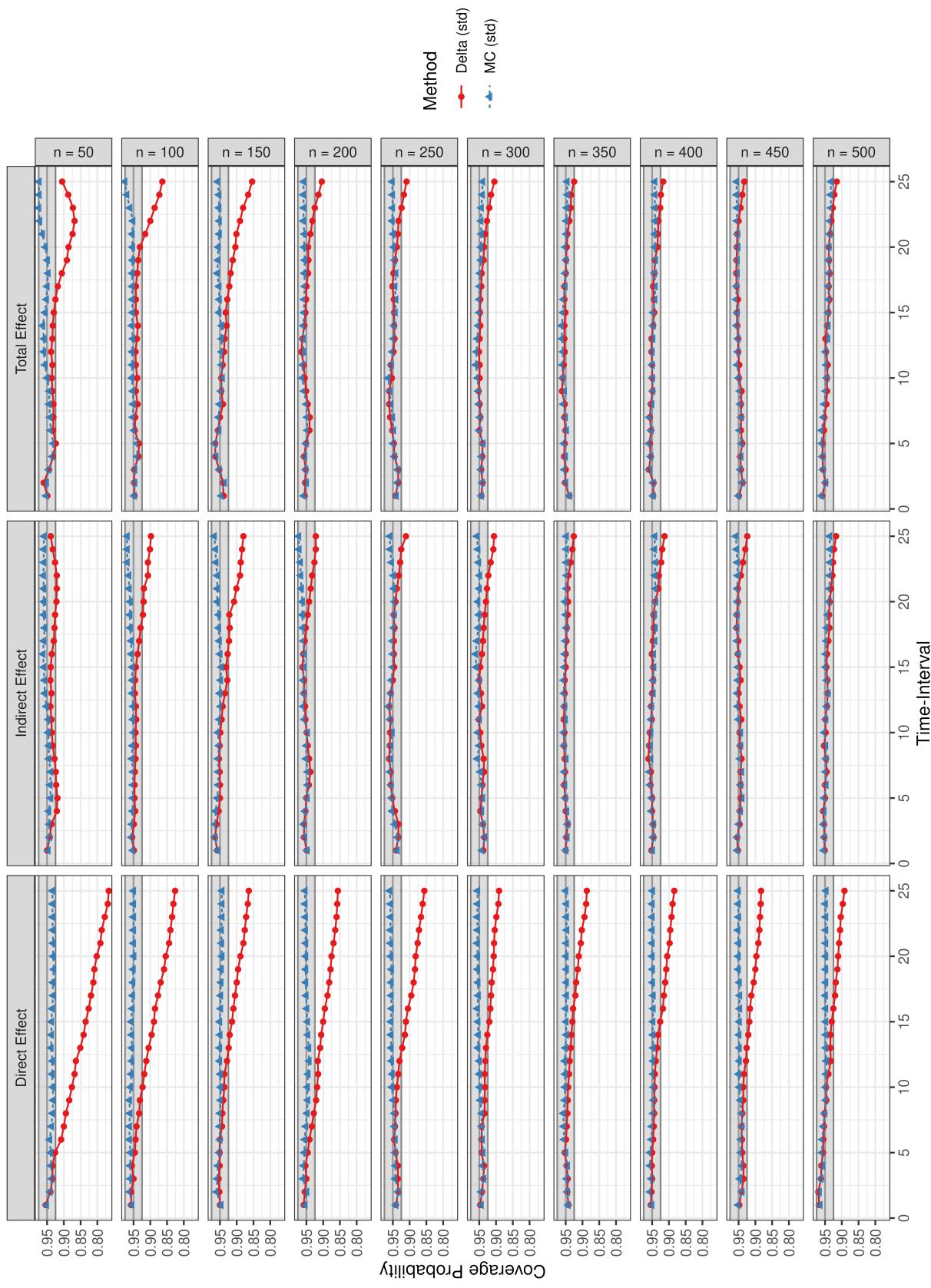


Figure 8
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Moderate Coupling / Standardized)

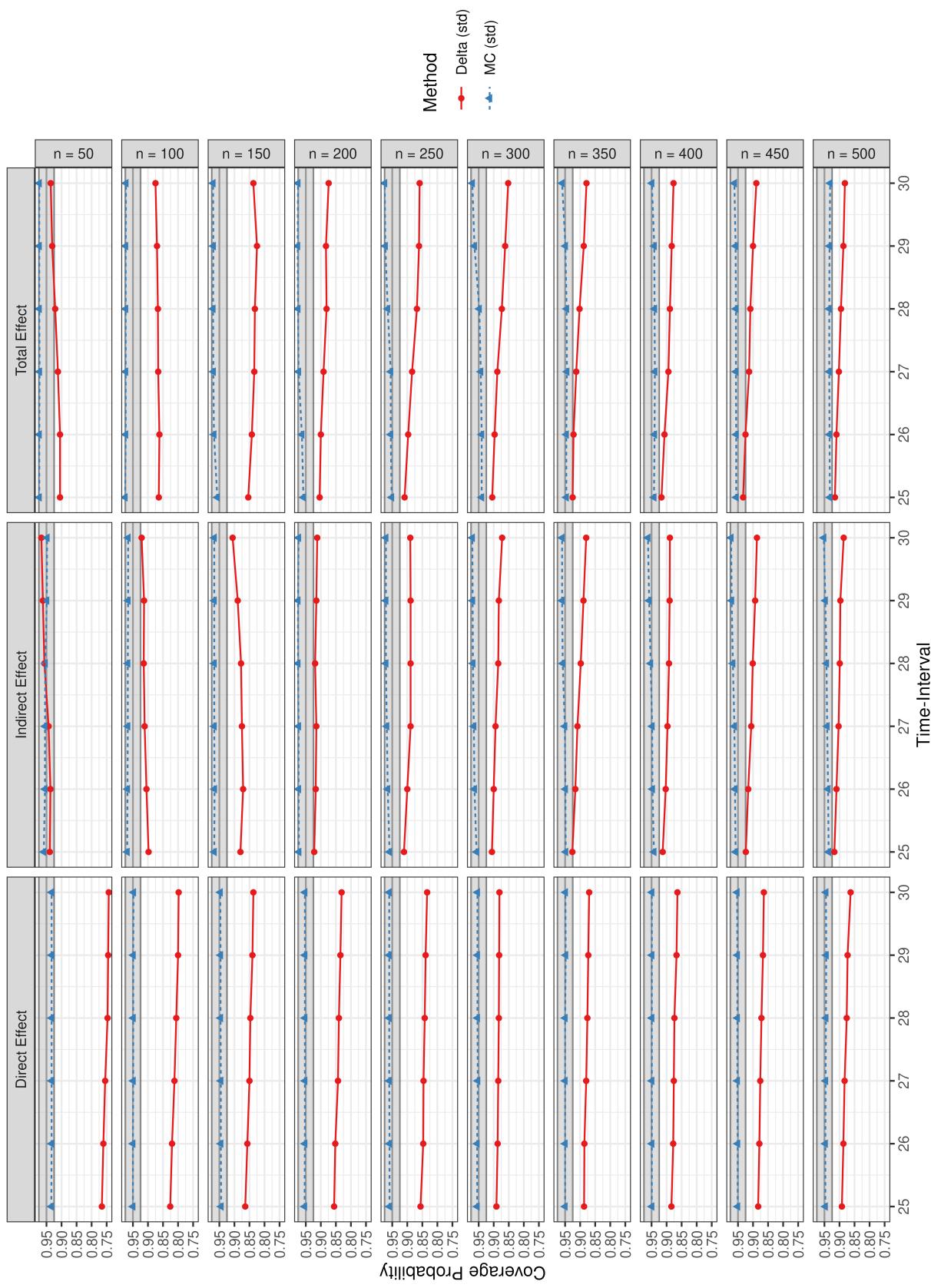


Figure 9
Monte Carlo Simulation Study Statistical Power (Moderate Coupling / Standardized)

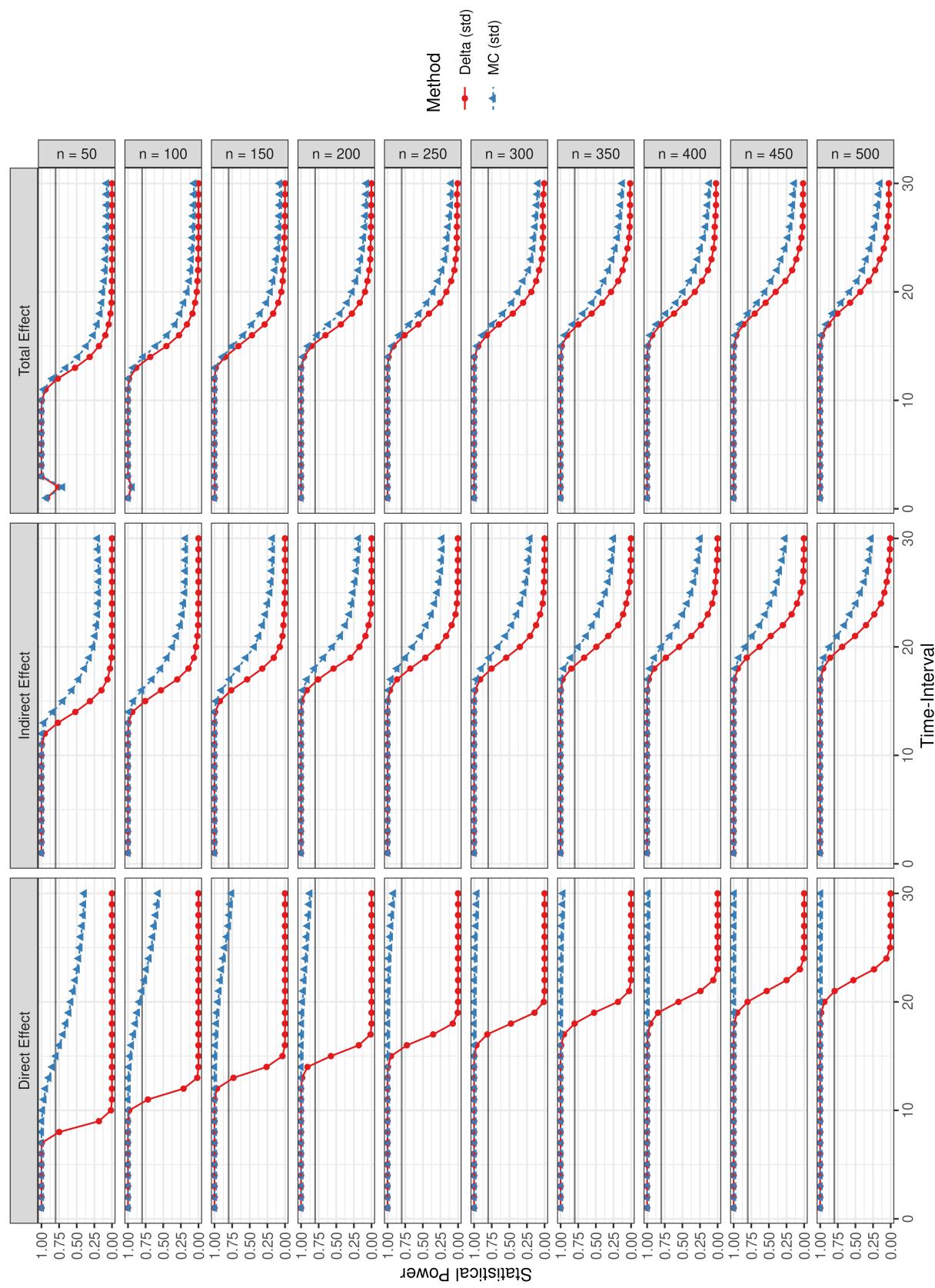


Figure 10
Monte Carlo Simulation Study Type I Error Rate (Moderate Coupling / Standardized)

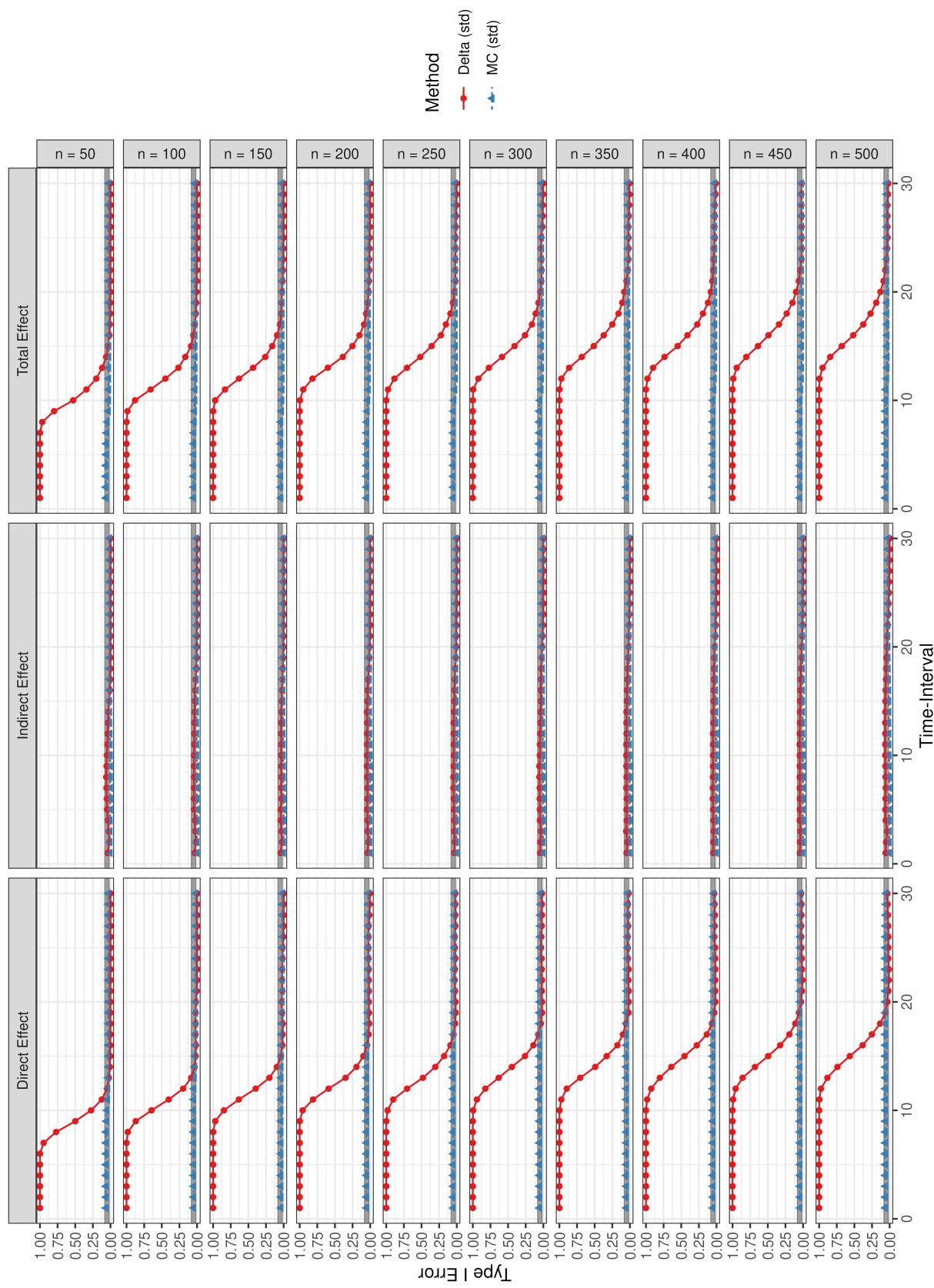


Figure 11
Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 / Strong Coupling / Unstandardized)

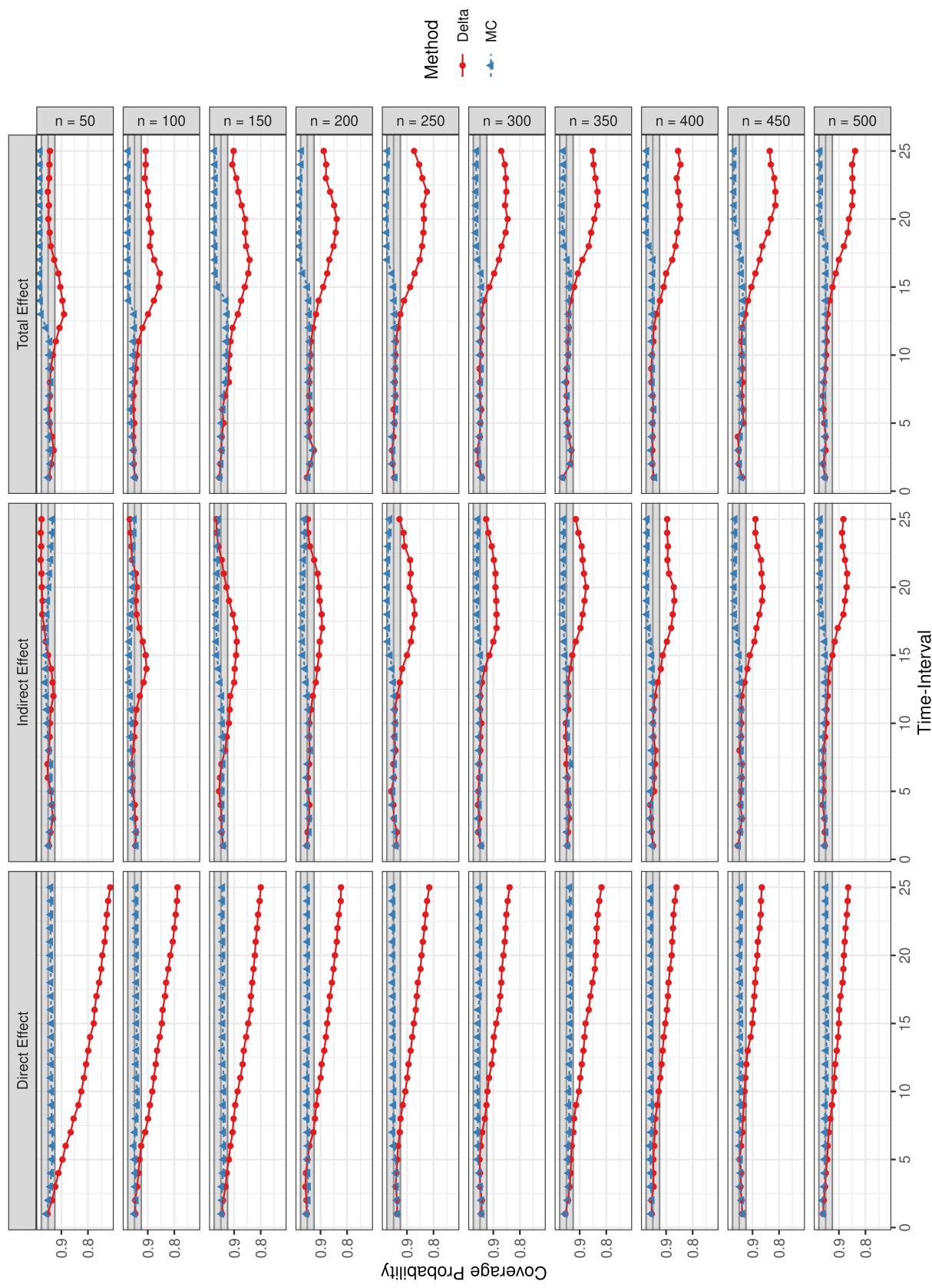


Figure 12
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Strong Coupling / Unstandardized)

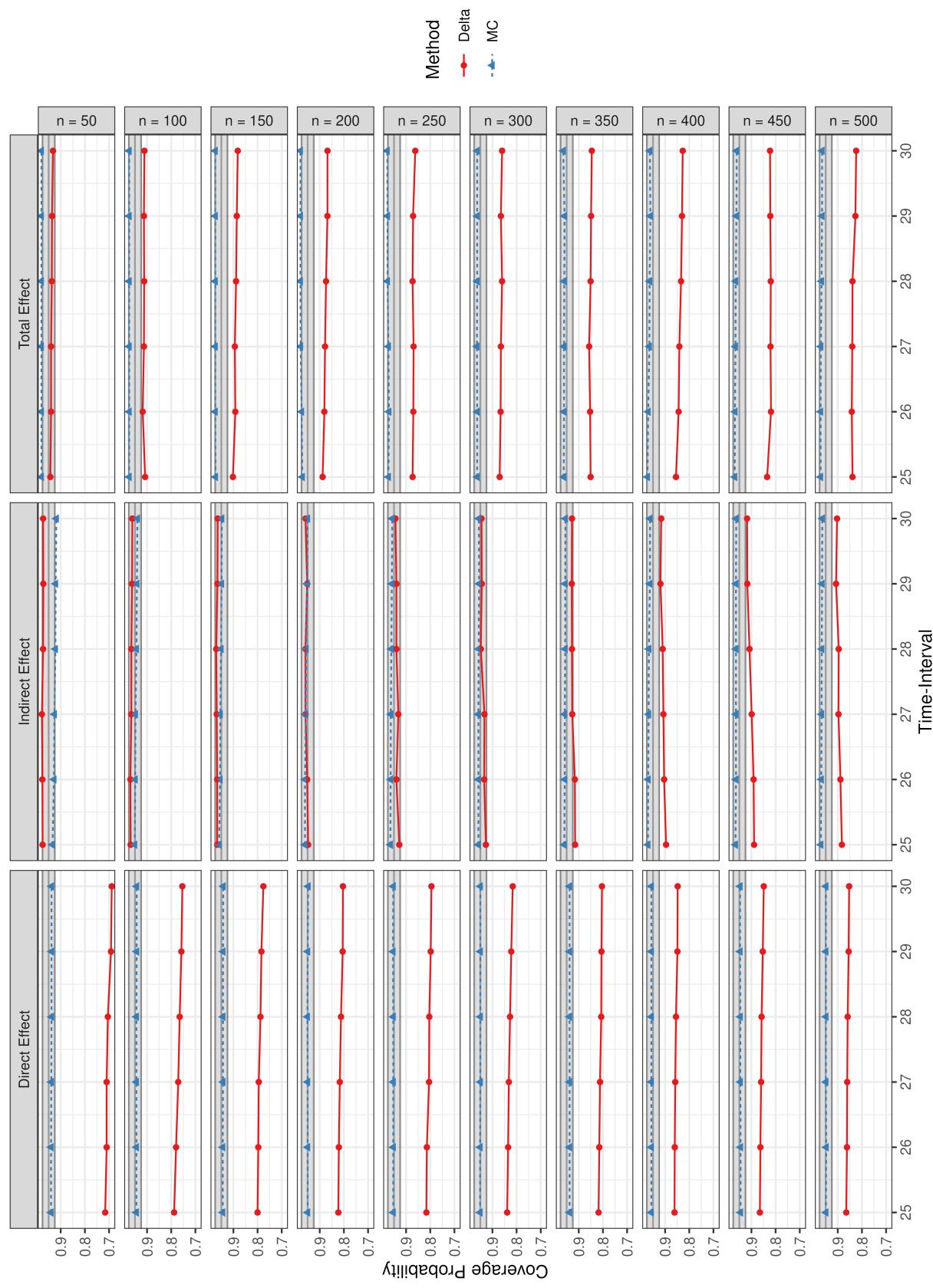


Figure 13
Monte Carlo Simulation Study Statistical Power (Strong Coupling / Unstandardized)

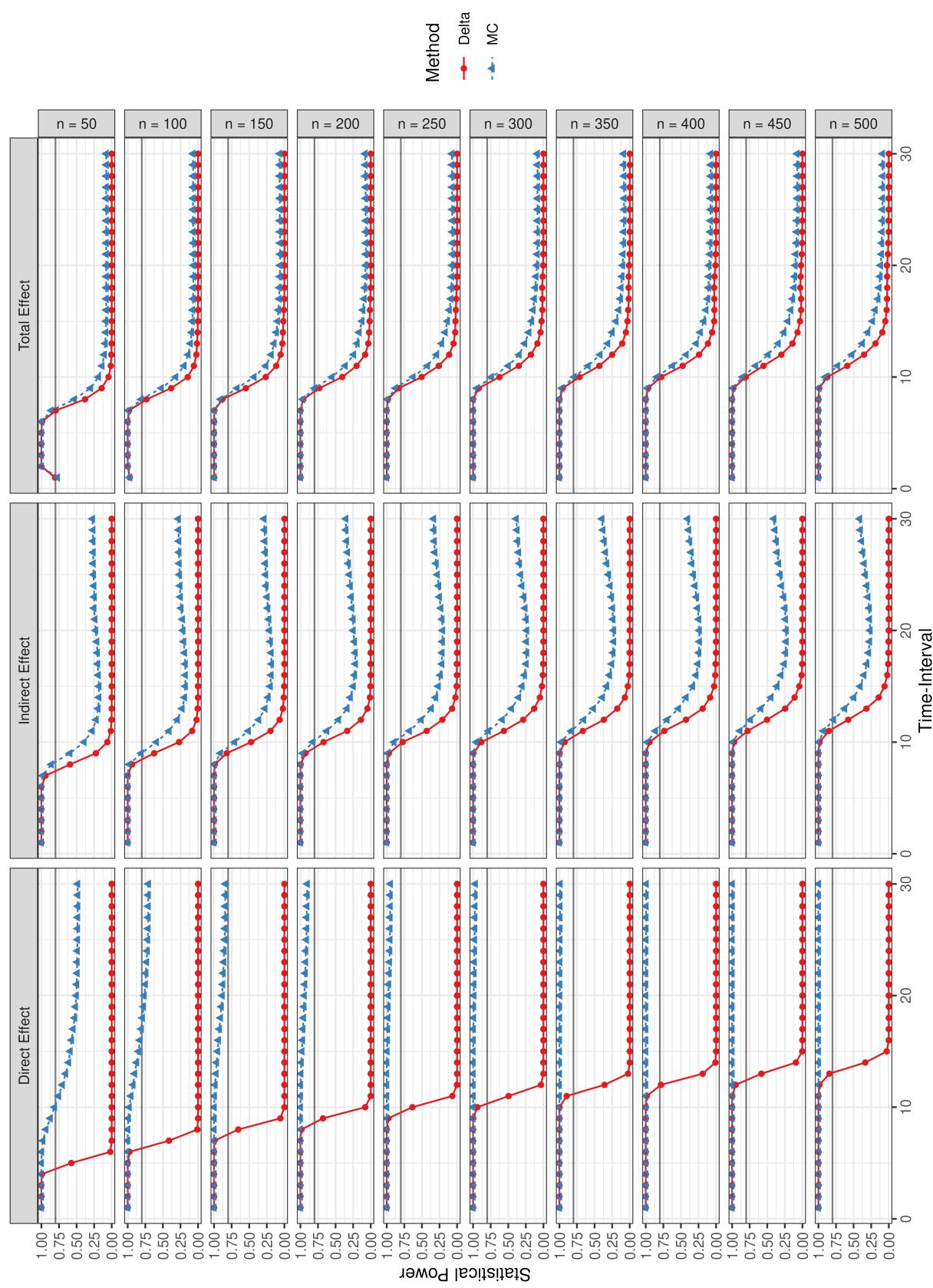


Figure 14
Monte Carlo Simulation Study Type I Error Rate (Strong Coupling / Unstandardized)

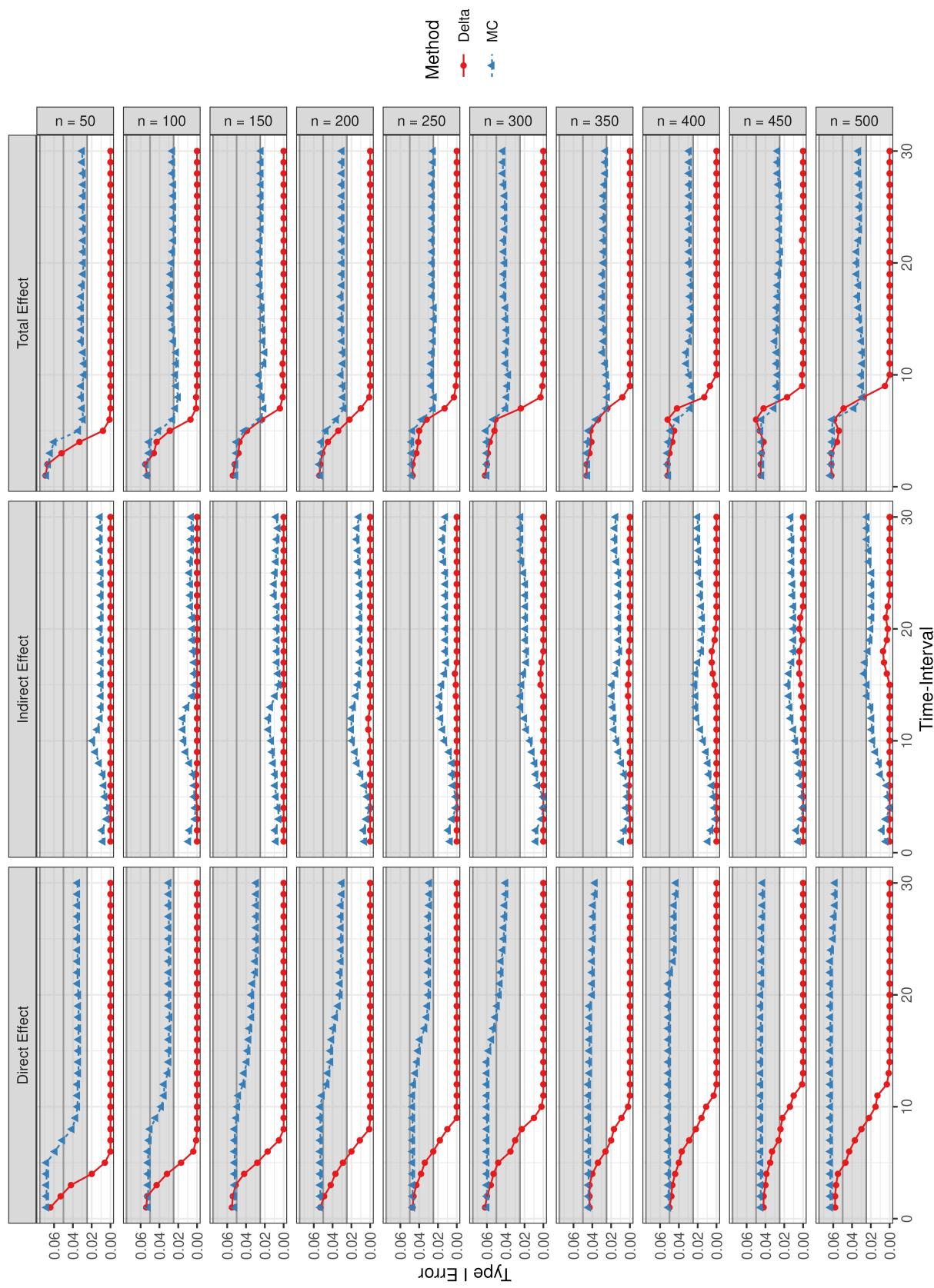


Figure 15
Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 / Strong Coupling / Standardized)

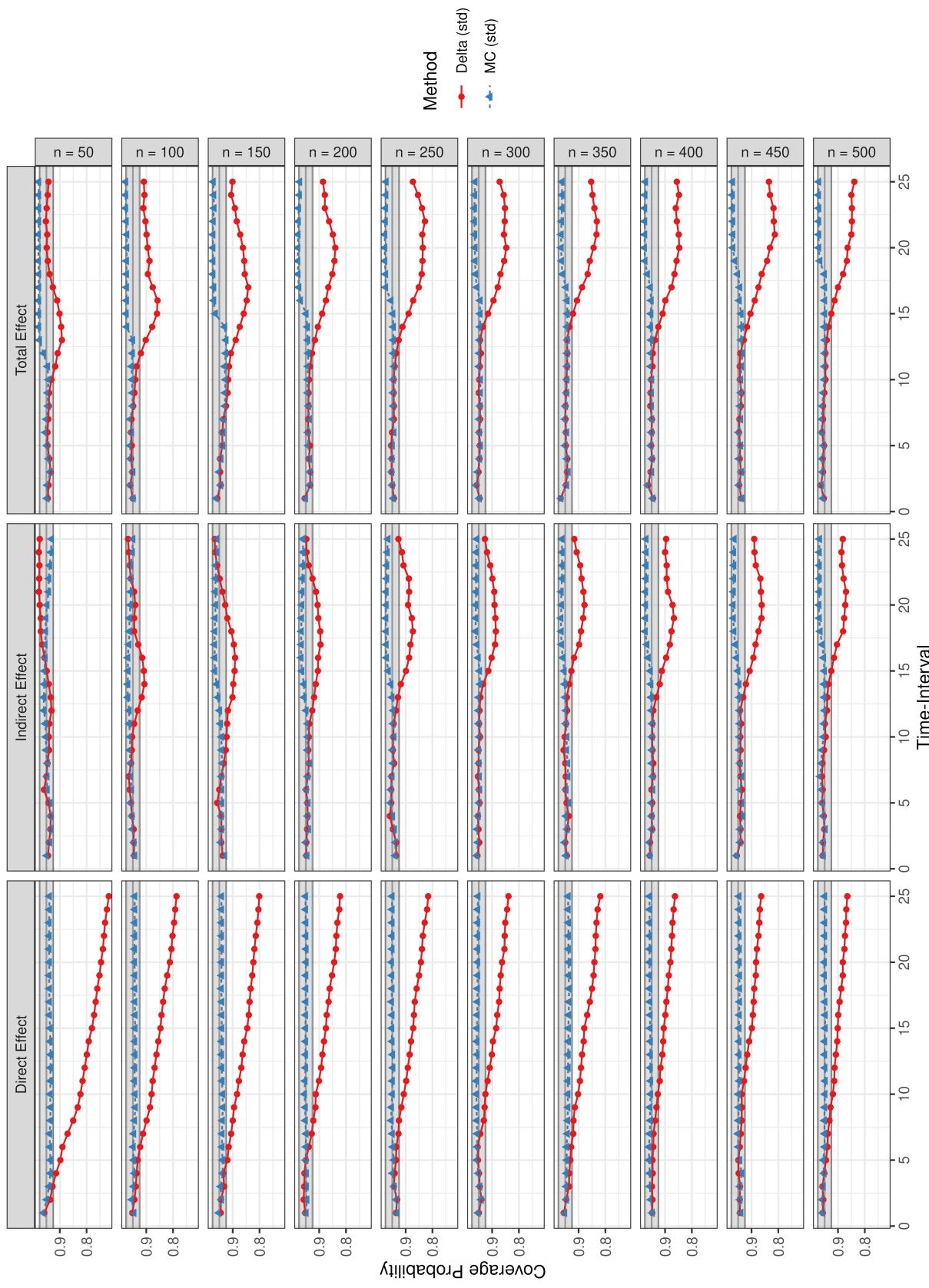
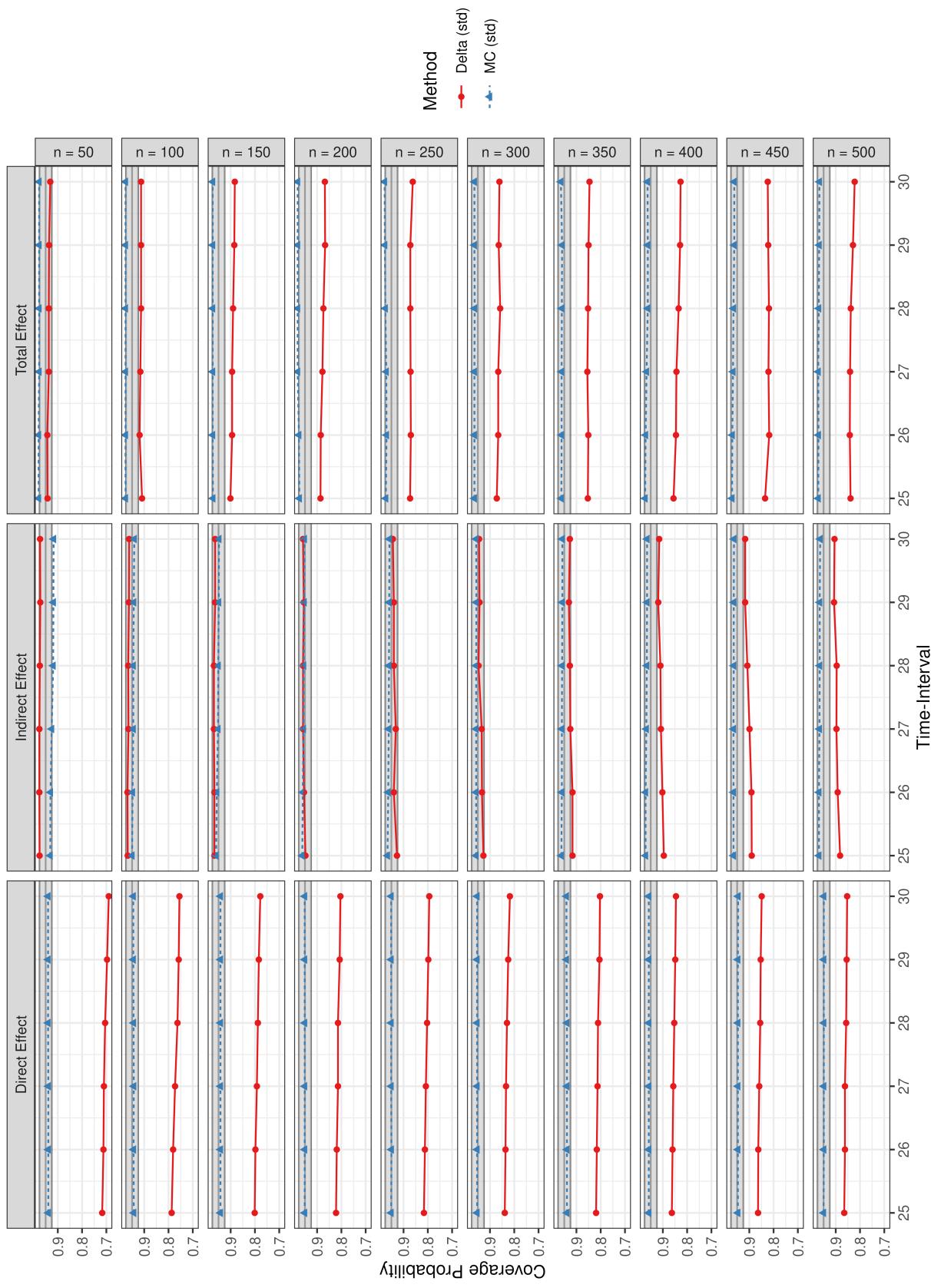


Figure 16
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Strong Coupling / Standardized)



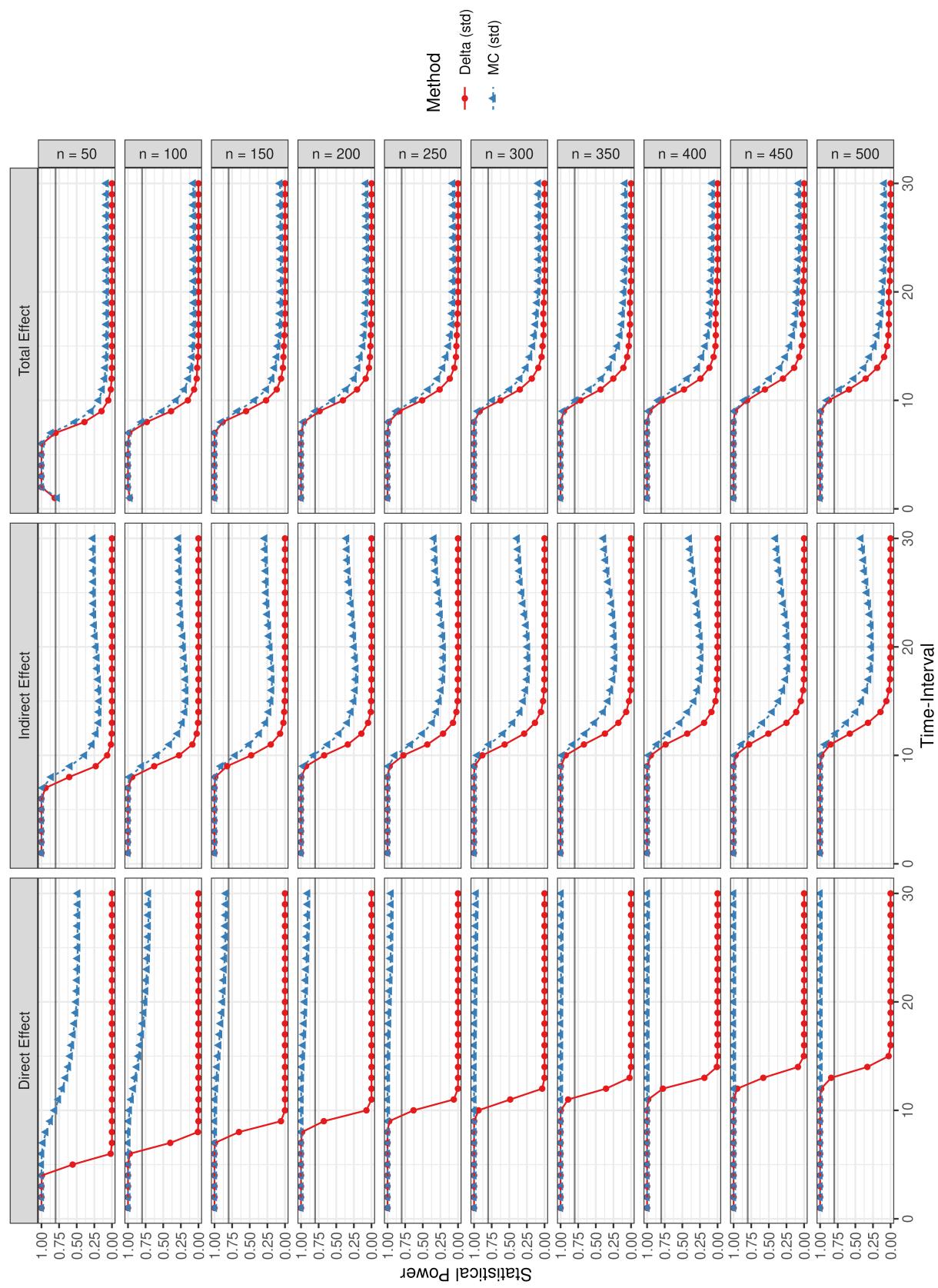


Figure 17
Monte Carlo Simulation Study Statistical Power (Strong Coupling / Standardized)

Figure 18
Monte Carlo Simulation Study Type I Error Rate (Strong Coupling / Standardized)

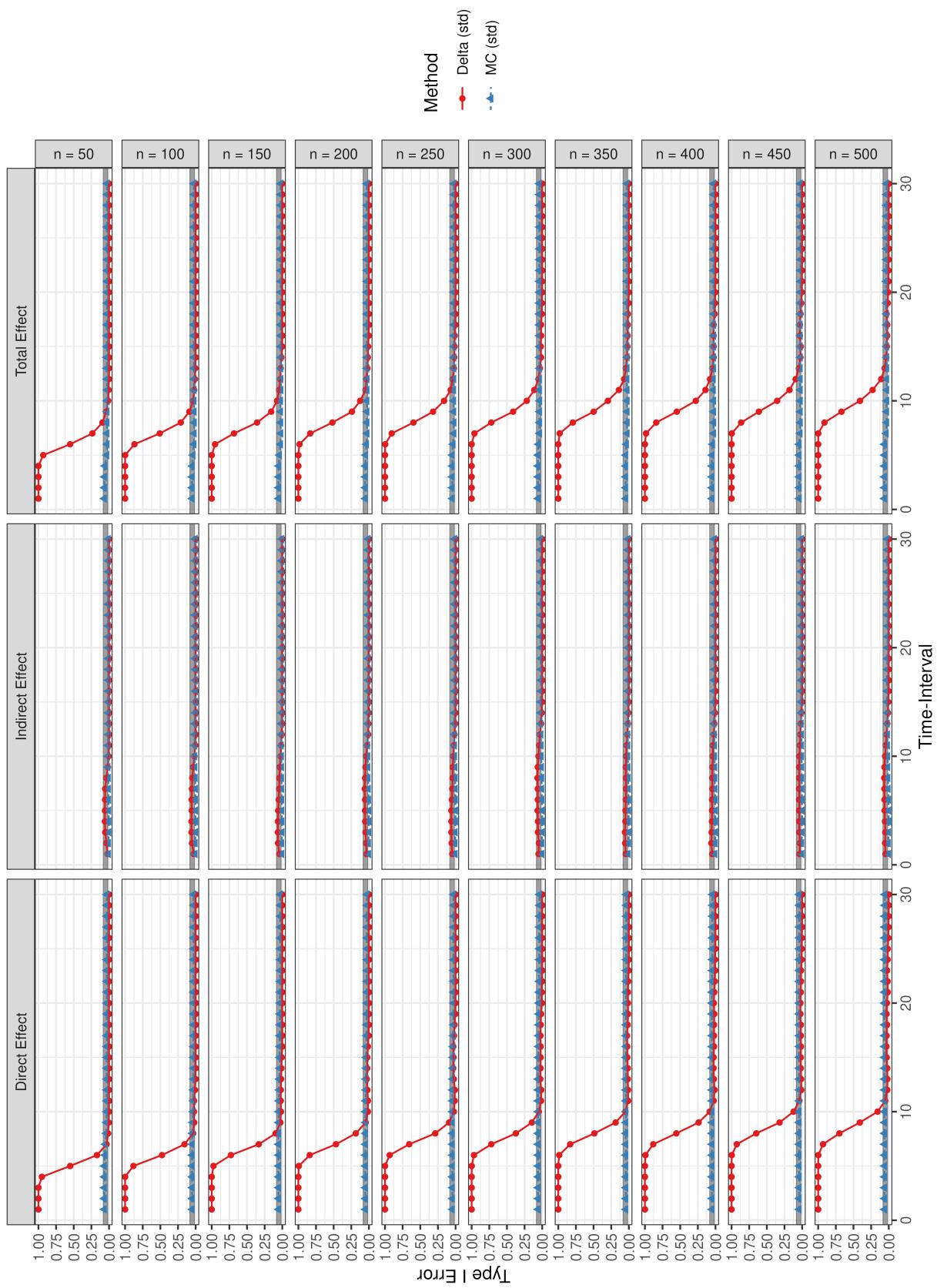


Figure 19
Monte Carlo Simulation Study Coverage Probabilities (Δt from 1 to 25 / Weak Coupling / Unstandardized)

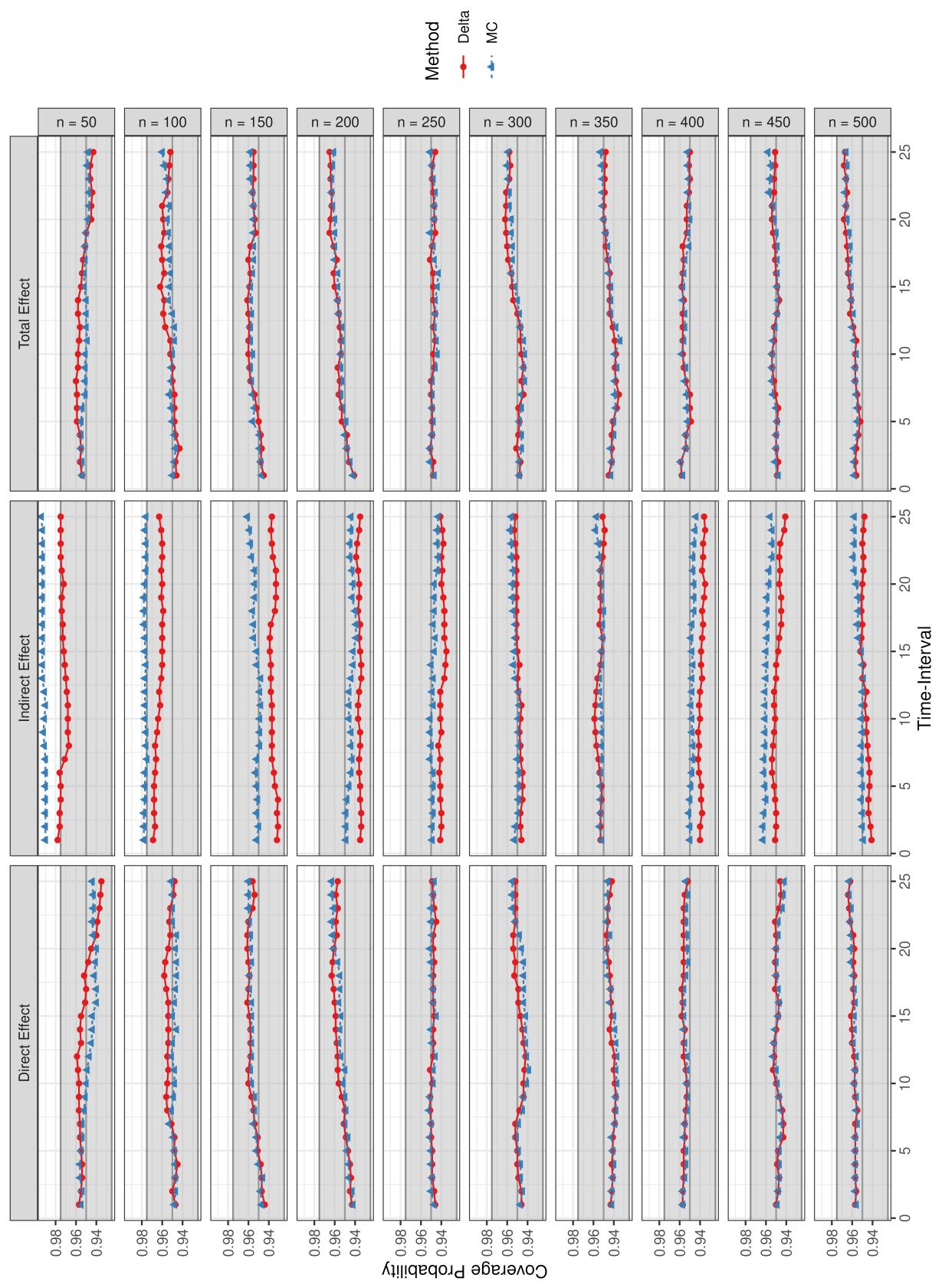


Figure 20
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Weak Coupling / Unstandardized)

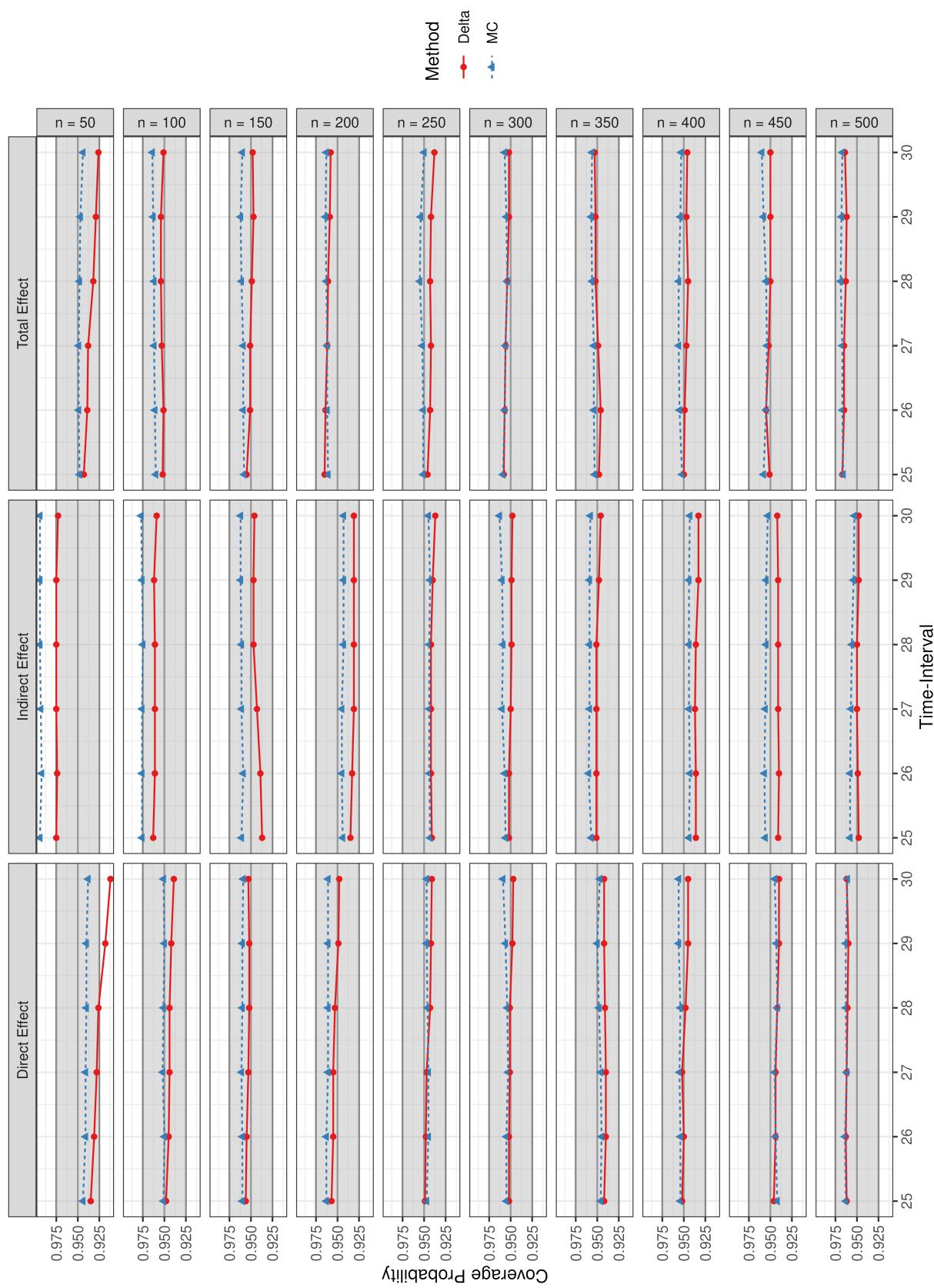


Figure 21
Monte Carlo Simulation Study Statistical Power (Weak Coupling / Unstandardized)

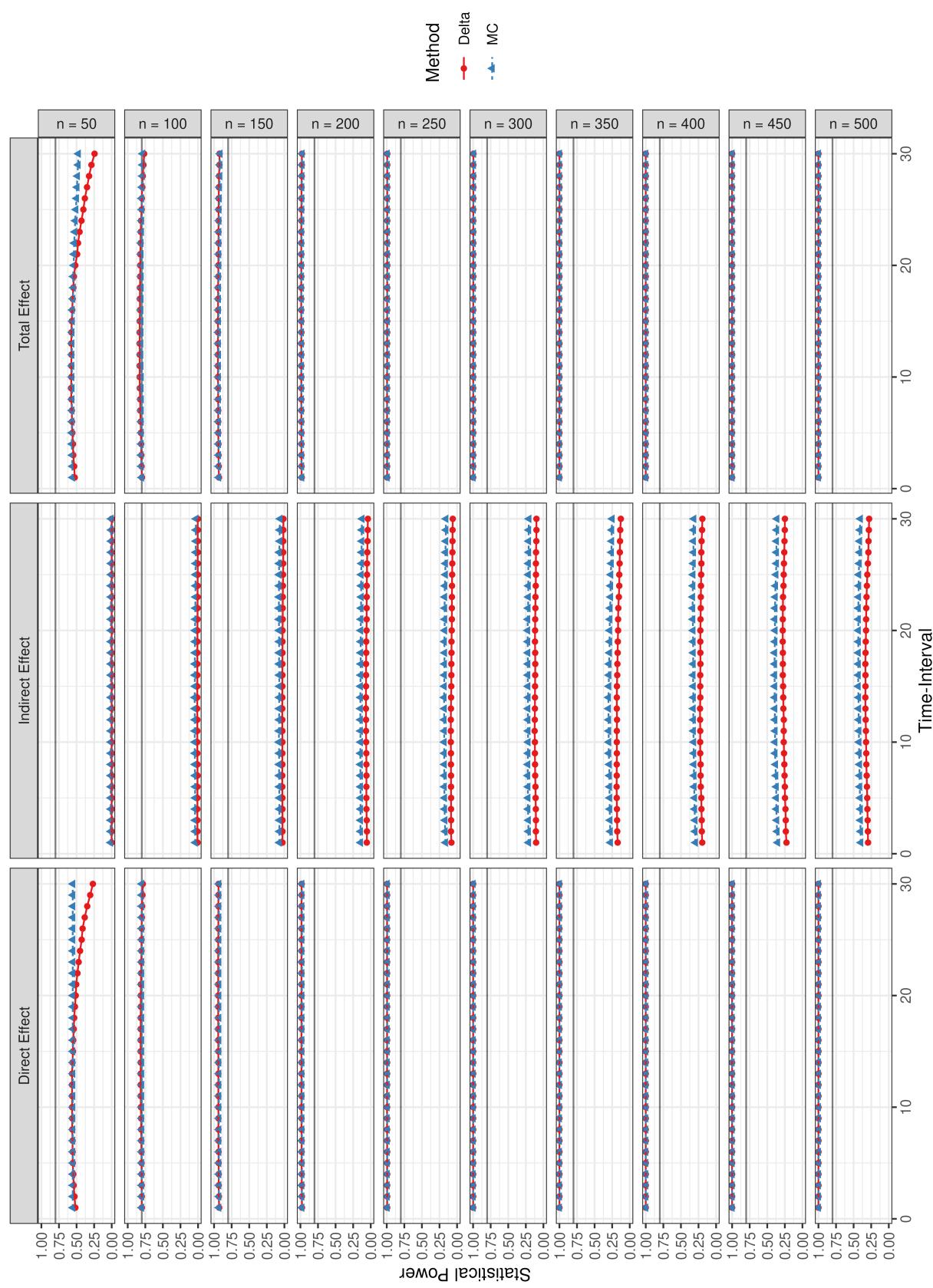


Figure 22
Monte Carlo Simulation Study Type I Error Rate (Weak Coupling / Unstandardized)

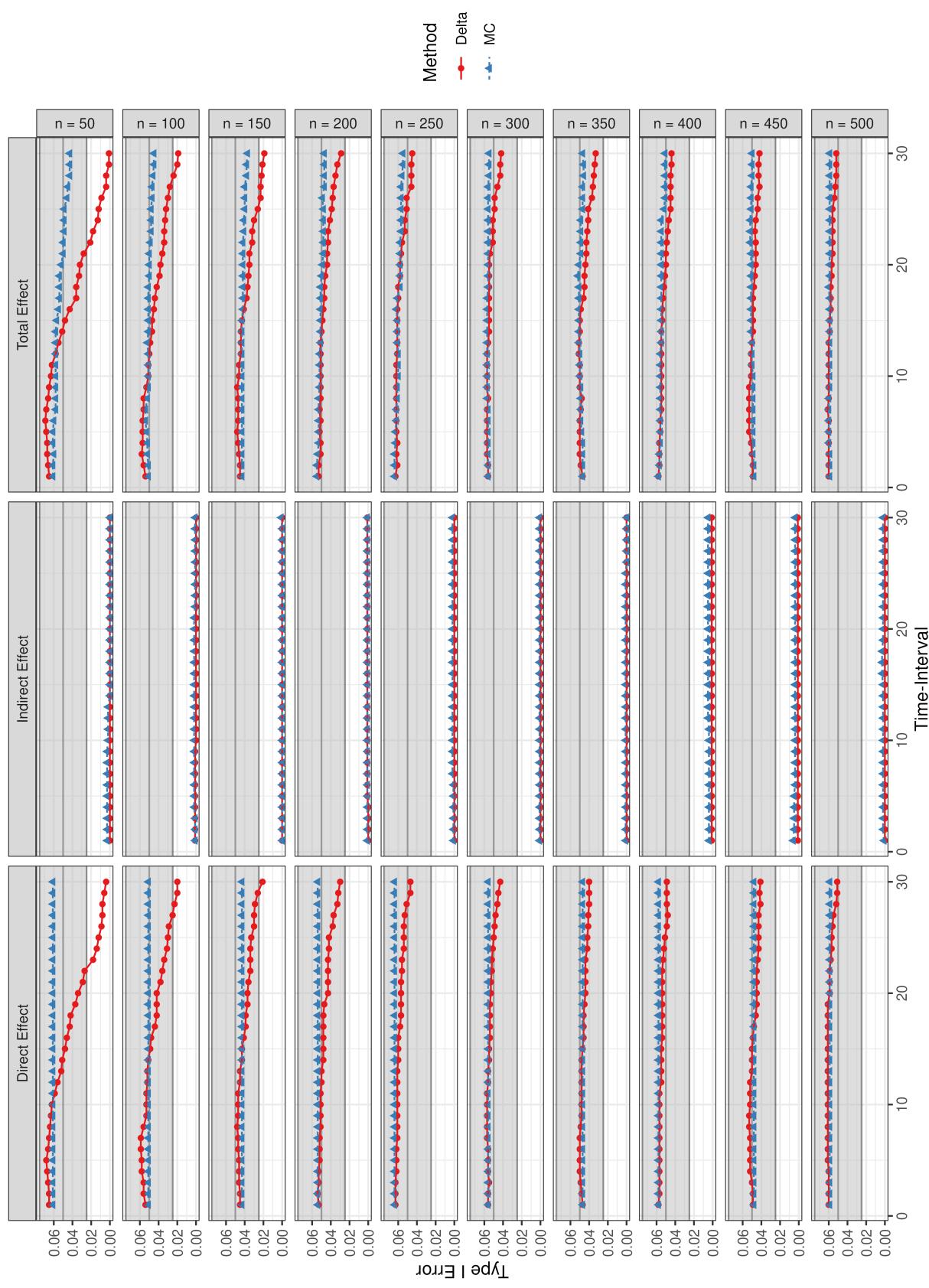


Figure 23 Monte Carlo Simulation Study Coverage Probabilities (Δ from 1 to 25 / Weak Coupling / Standardized)

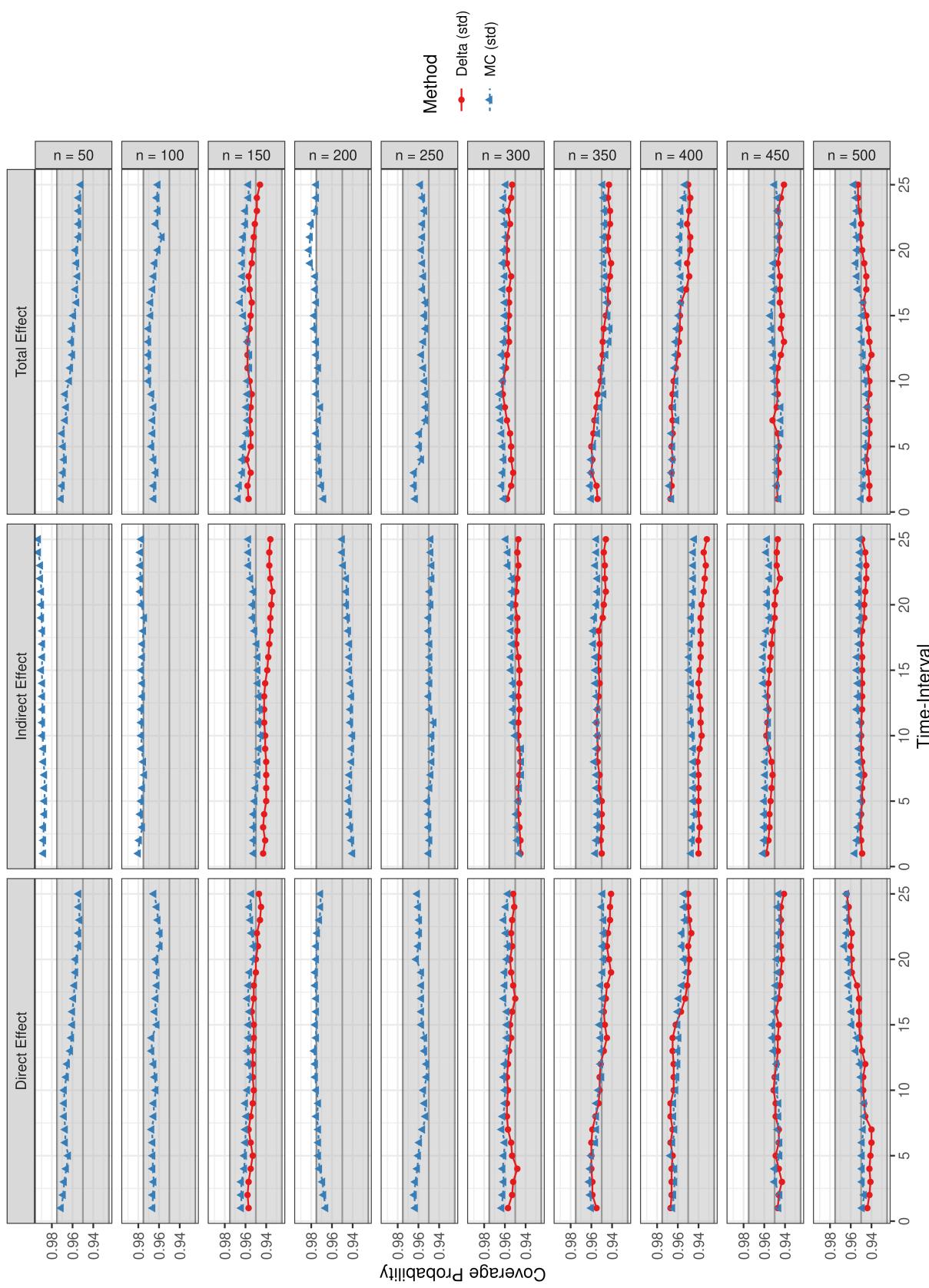


Figure 24
Monte Carlo Simulation Study Coverage Probabilities (Δt from 25 to 30 / Weak Coupling / Standardized)

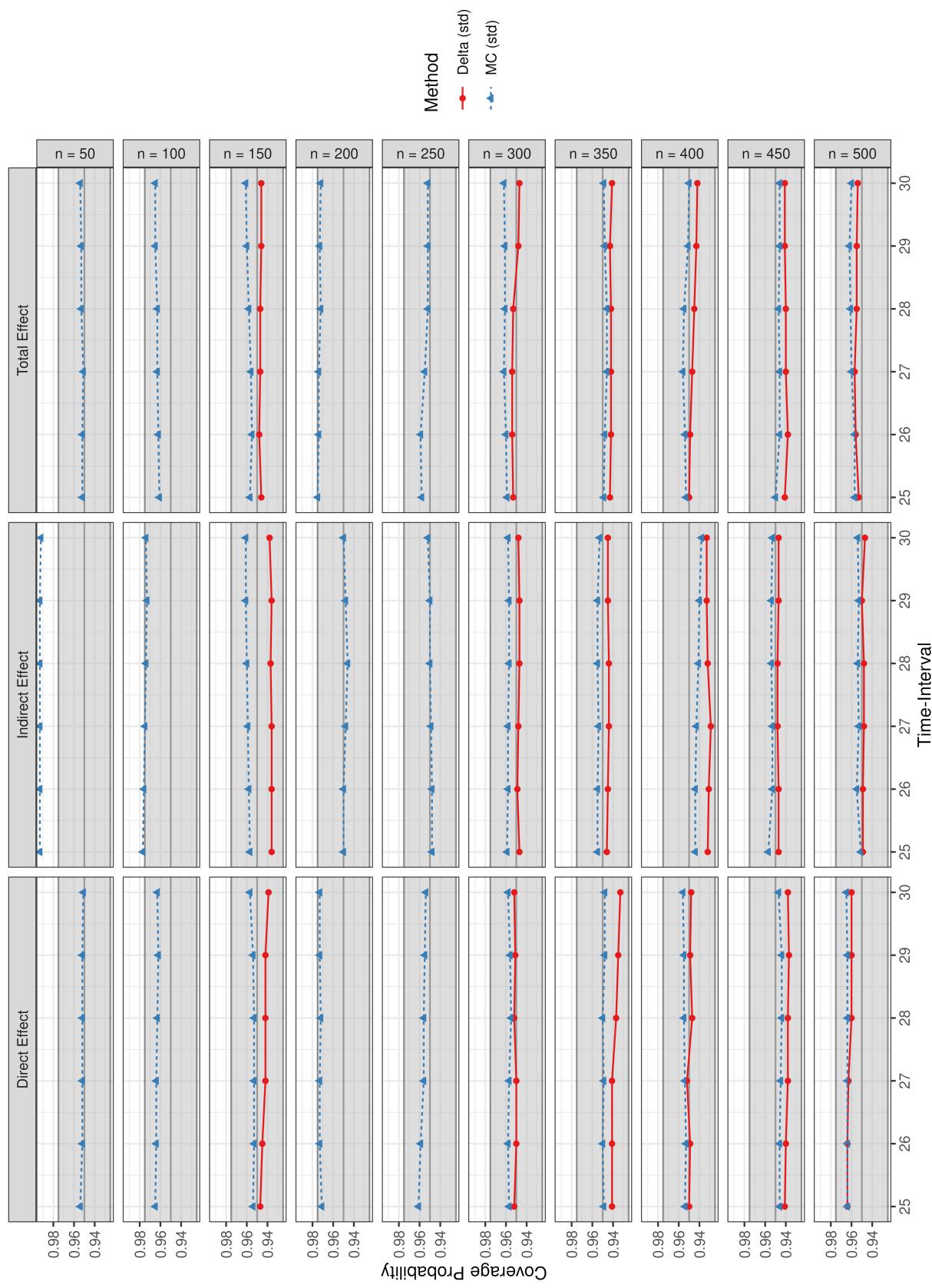


Figure 25
Monte Carlo Simulation Study Statistical Power (Weak Coupling / Standardized)

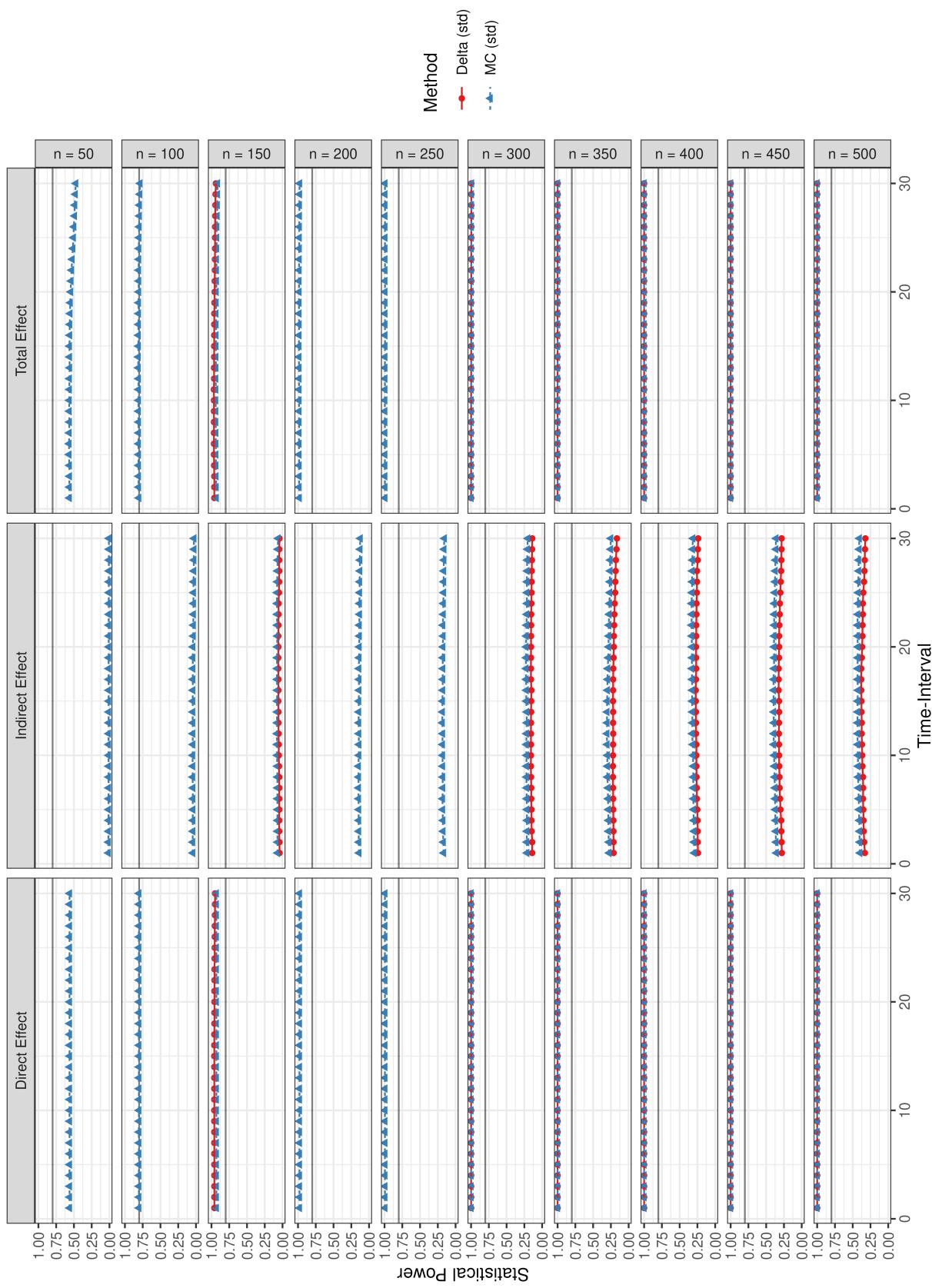


Figure 26
Monte Carlo Simulation Study Type I Error Rate (Weak Coupling / Standardized)

