Figure S.16: **The Empirical Power of the Rao's Efficient Score Tests of Additive Logistic Regression Model (2) and the GFLM (8) Using B-spline Basis, SKAT, SKAT-O, SKAT-C, and Burden-C, When Causal Variants Were only Rare, the Region Size is 3 kb, the Constant $k = 1.0$ in Genetic Effect Size $|\beta_{ij}|$, and 20%/80% Causal Variants Had Negative/Positive Effects.** The order of B-spline basis was 4, and the number of B-spline basis functions was $K = K_\beta = 10$.
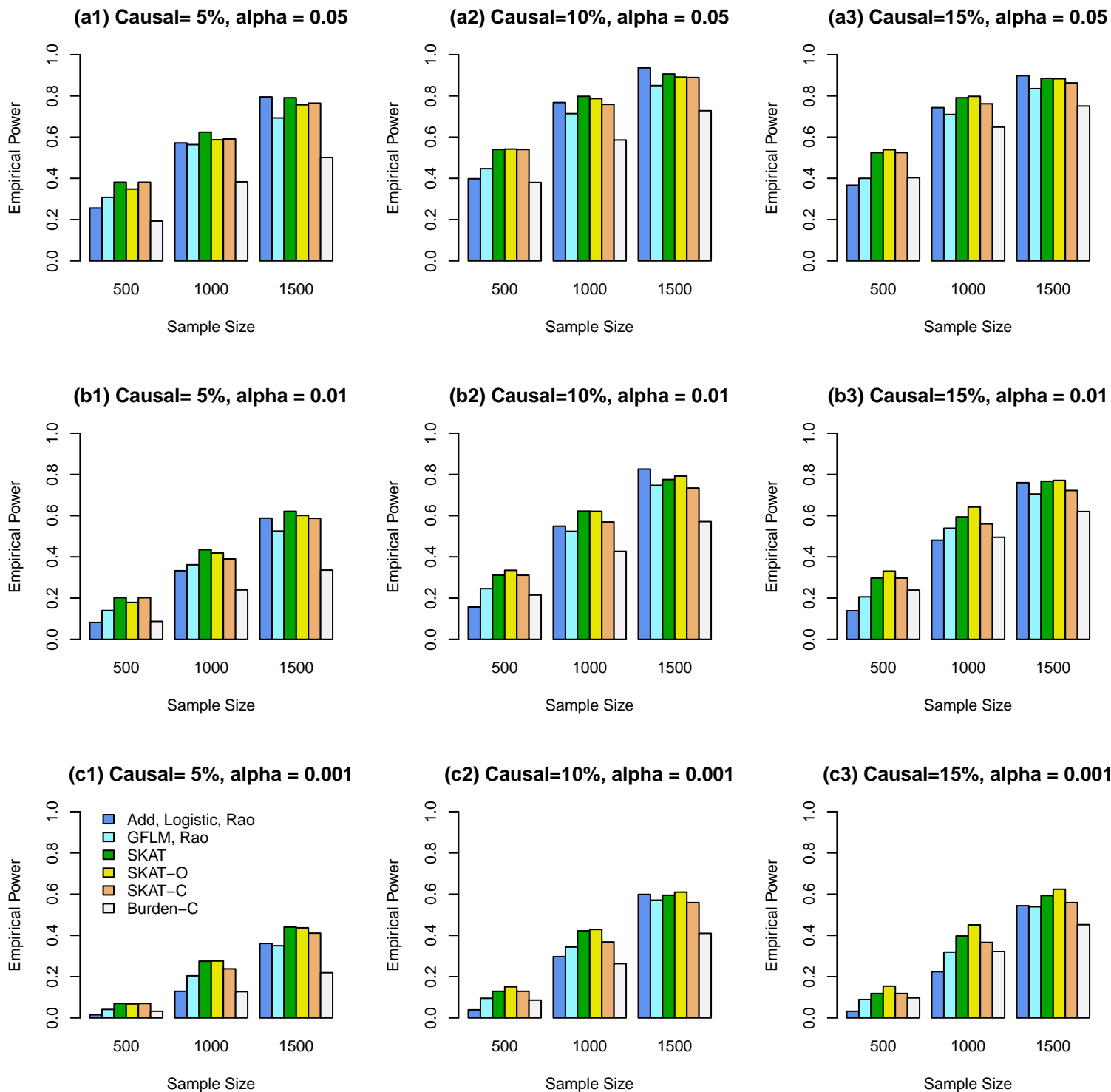
Figure S.17: **The Empirical Power of the Rao's Efficient Score Tests of Additive Logistic Regression Model (2) and the GFLM (8) Using B-spline Basis, SKAT, SKAT-O, SKAT-C, and Burden-C, When Causal Variants Were only Rare, the Region Size is 6 kb, the Constant $k = 1.25$ in Genetic Effect Size $|\beta_{ij}|$, and 20%/80% Causal Variants Had Negative/Positive Effects.** The order of B-spline basis was 4, and the number of B-spline basis functions was $K = K_\beta = 10$.
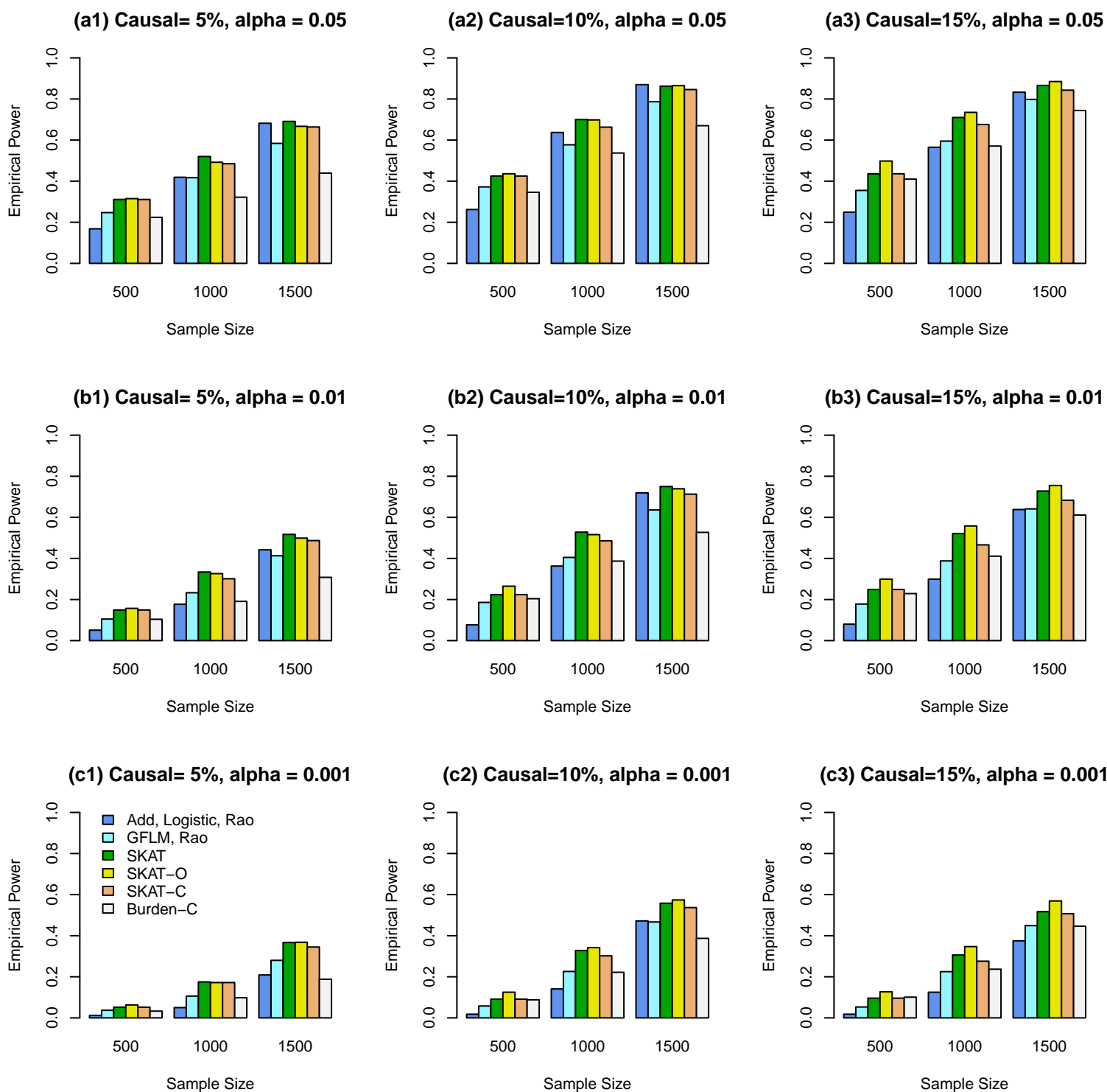
Figure S.18: **The Empirical Power of the Rao's Efficient Score Tests of Additive Logistic Regression Model (2) and the GFLM (8) Using B-spline Basis, SKAT, SKAT-O, SKAT-C, and Burden-C, When Causal Variants Were only Rare, the Region Size is 9 kb, the Constant $k = 1.5$ in Genetic Effect Size $|\beta_{ij}|$, and 20%/80% Causal Variants Had Negative/Positive Effects.** The order of B-spline basis was 4, and the number of B-spline basis functions was $K = K_\beta = 10$.
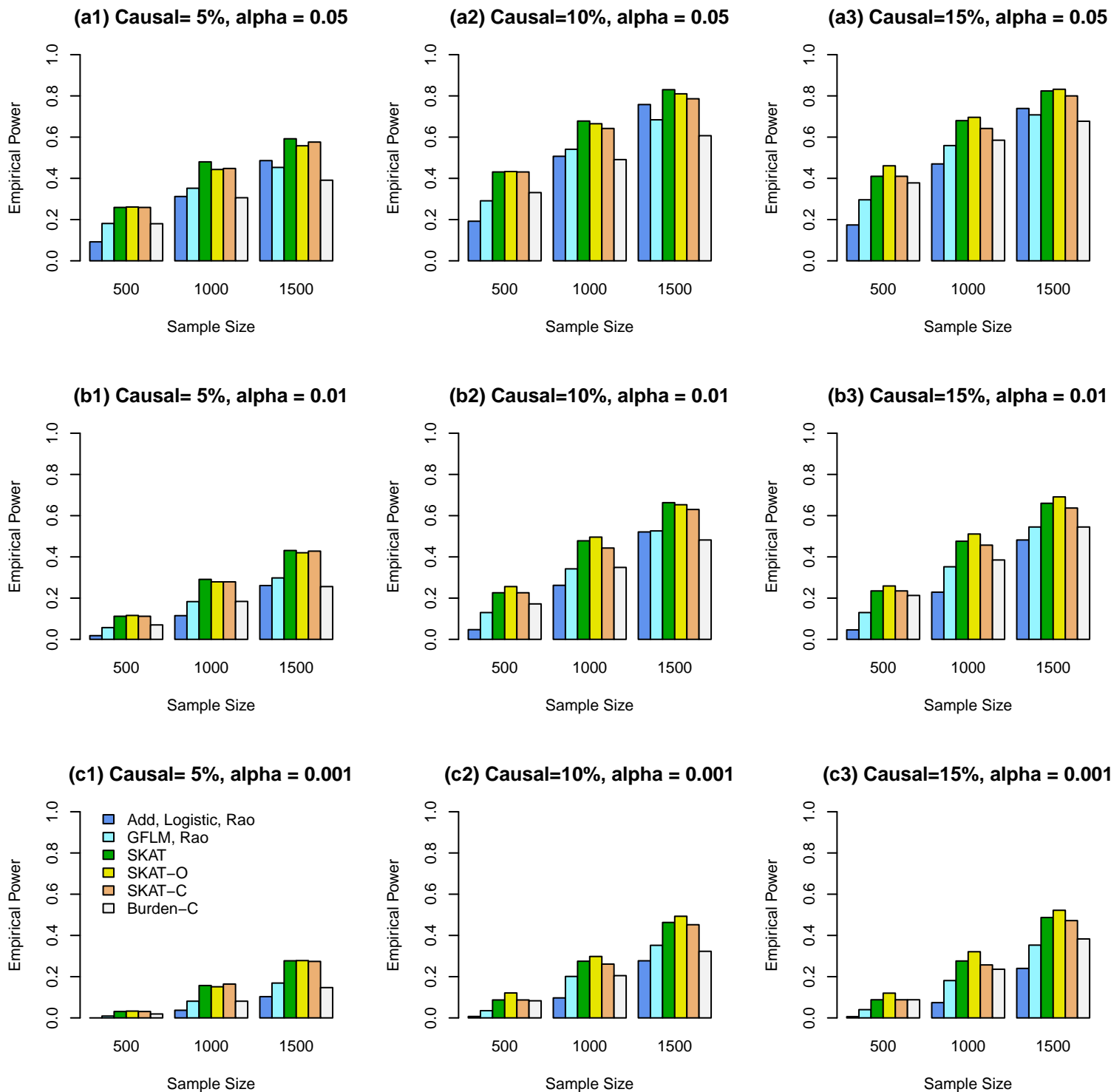
Figure S.19: **The Empirical Power of the Rao's Efficient Score Tests of Additive Logistic Regression Model (2) and the GFLM (8) Using B-spline Basis, SKAT, SKAT-O, SKAT-C, and Burden-C, When Causal Variants Were only Rare, the Region Size is 12 kb, the Constant $k = 1.75$ in Genetic Effect Size $|\beta_{ij}|$, and 20%/80% Causal Variants Had Negative/Positive Effects.** The order of B-spline basis was 4, and the number of B-spline basis functions was $K = K_\beta = 10$.
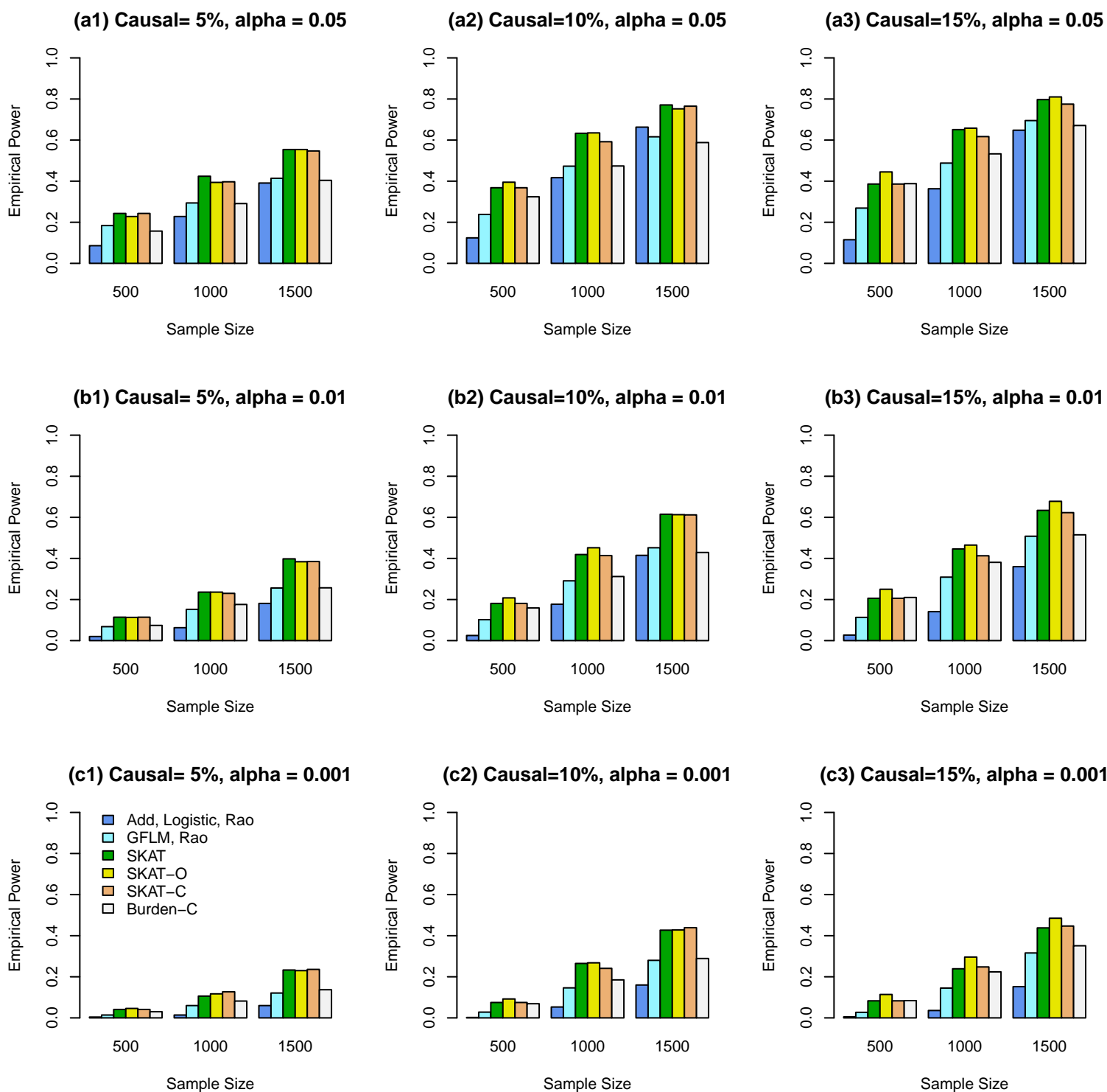
Figure S.20: **The Empirical Power of the Rao's Efficient Score Tests of Additive Logistic Regression Model (2) and the GFLM (8) Using B-spline Basis, SKAT, SKAT-O, SKAT-C, and Burden-C, When Causal Variants Were only Rare, the Region Size is 15 kb, the Constant $k = 2.0$ in Genetic Effect Size $|\beta_{ij}|$, and 20%/80% Causal Variants Had Negative/Positive Effects.** The order of B-spline basis was 4, and the number of B-spline basis functions was $K = K_\beta = 10$.

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