1 Simulation

Let p be the minor allele frequency (MAF) of the marker of interest in the population, we consider case-control data with $r = 500$ cases and $s = 500$ controls without covariates, $\lambda \in \{1.1, 1.3, 1.5\}$, $p \in \{0.15, 0.30, 0.45\}$, the true $\theta^{(0)} \in \{1/2, 1\}$, and the disease prevalence $k = 0.05$. We generate $Nrep = 1000$ datasets, and we compute the means and standard deviations of $e_P(Z_{MERT}, Z_{\theta^{(0)}})$, $\tilde{e}_C(Z_{MERT}, Z_{\theta^{(0)}})$ and $\tilde{e}_B(Z_{MERT}, Z_{\theta^{(0)}})$, For Z_{MERT}, we choose $\theta_i = 0, \theta_j = 1$.

Table 1 show the result, the means of AREs and the standard deviations of AREs are in brackets. First we can see the mean of all three AREs are less than 1, which show that Z_{θ^0} is consistent better than Z_{MERT}. Corresponding to this fact when $\theta = \theta^{(0)}$ is the true value, $Z_{\theta^{(0)}}$ is asymptotically most powerful. Then the three AREs are increased with the p or λ increased. Third, the e_P has the lowest variance among the three AREs, next is $\tilde{e}_C$, last is $\tilde{e}_B$.

Table 1. The AREs of Z_{MERT} and $Z_{\theta^{(0)}}$.

		$\lambda = 1.1$			$\lambda = 1.3$			$\lambda = 1.5$		
MAF	$\theta^{(0)}$	e_P	$\tilde{e}_C$	$\tilde{e}_B$	e_P	$\tilde{e}_C$	$\tilde{e}_B$	e_P	$\tilde{e}_C$	$\tilde{e}_B$
0.15	1/2	0.874	0.876	0.827	0.887	0.904	0.856	0.895	0.917	0.869
		(0.056)	(0.1)	(0.115)	(0.048)	(0.084)	(0.11)	(0.039)	(0.069)	(0.097)
	1	0.654	0.814	0.723	0.654	0.837	0.746	0.652	0.85	0.761
		(0.037)	(0.094)	(0.101)	(0.031)	(0.084)	(0.094)	(0.029)	(0.075)	(0.092)
0.3	1/2	0.963	0.94	0.912	0.97	0.954	0.929	0.973	0.961	0.937
		(0.018)	(0.05)	(0.069)	(0.013)	(0.042)	(0.064)	(0.011)	(0.039)	(0.061)
	1	0.73	0.841	0.751	0.729	0.853	0.763	0.728	0.863	0.775
		(0.03)	(0.045)	(0.056)	(0.028)	(0.043)	(0.055)	(0.025)	(0.037)	(0.05)
0.45	1/2	0.991	0.985	0.978	0.993	0.986	0.978	0.995	0.989	0.983
		(0.006)	(0.038)	(0.055)	(0.004)	(0.036)	(0.054)	(0.003)	(0.032)	(0.051)
	1	0.76	0.85	0.766	0.758	0.856	0.771	0.76	0.861	0.775
		(0.032)	(0.033)	(0.044)	(0.031)	(0.031)	(0.042)	(0.027)	(0.028)	(0.039)