

BASELINE, PLACEBO, AND TREATMENT: EFFICIENT
ESTIMATION FOR THREE-GROUP EXPERIMENTS

ONLINE APPENDIX

This online appendix presents additional results on the efficiency and optimality of the three-group design. The first set of figures (Figures 1 – 3) replicates Figures 1 – 3 in the paper; the other 9 sets of figures show results for different sets of parameter values: the proportion of compliers (α), the treatment effect (τ), the probability of voting given treatment and contact (π_T^C), and the probability of voting given no contact in the treatment group ($\pi^{\bar{C}}$). These parameter values are displayed in the topright corner of each graph. For all sets of parameter values, the three-group design is strictly more efficient than either of the two-group designs. Its advantage over the other designs continues to vary with the contact rate. For very low contact rates, standard errors from the three-group design are not much smaller than standard errors from the placebo-treatment design. For very high contact rates, standard errors from the three-group design are not much smaller than standard errors from the baseline-treatment design. Depending on the exact combination of parameter values, however, the contact rate at which the advantage of the three-group design over the second-best design is maximized changes. The same is true for the *ex ante* optimal allocation of treatment and placebo group subjects. Depending on the parameter values, the optimal allocation of subjects to the placebo and treatment groups changes, ranging generally between .5 and 1.

ThreeGroups, an R package implementing the estimator proposed in the paper, can be downloaded from the Comprehensive R Archive Network.

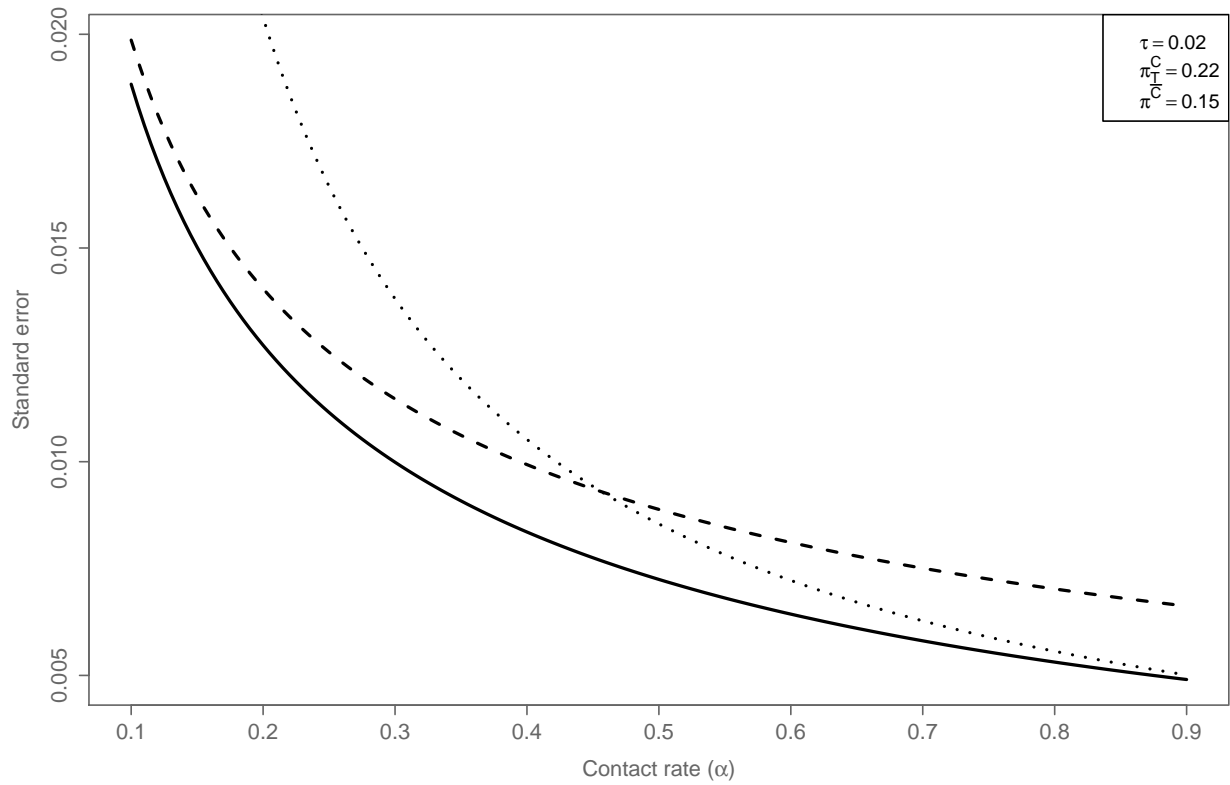


Figure 1: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

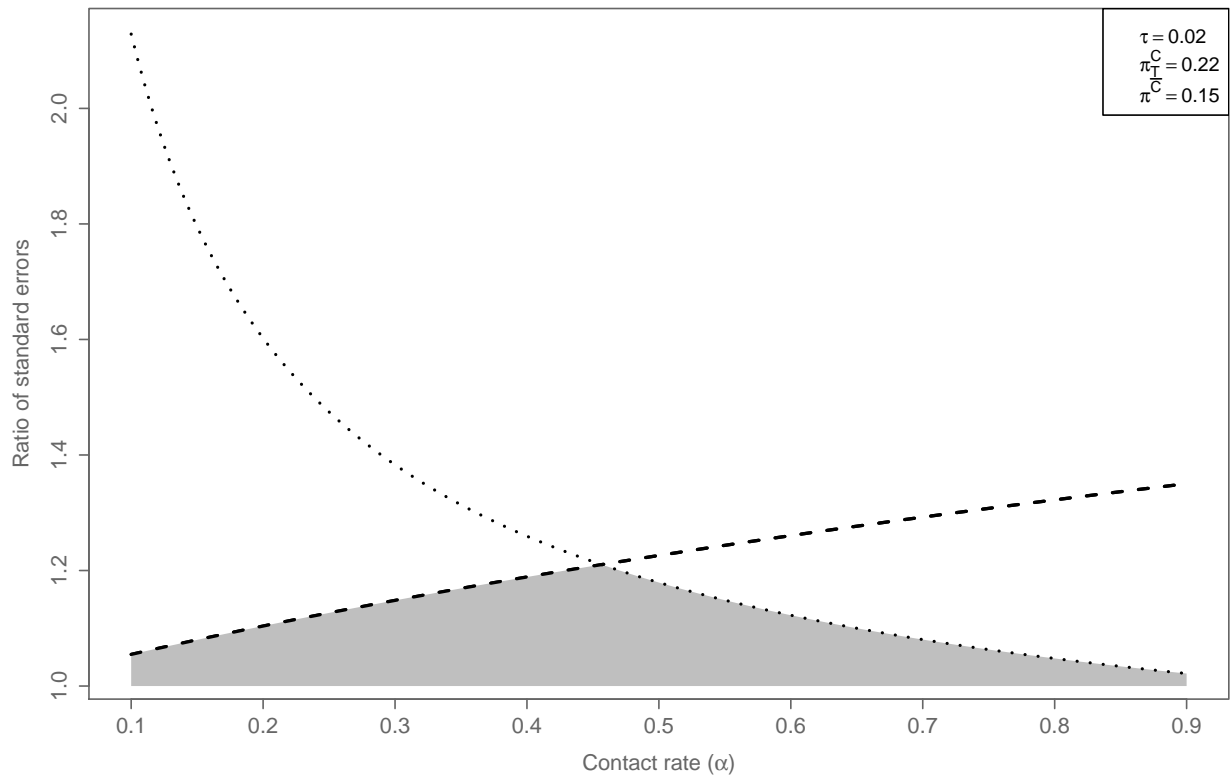


Figure 2: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

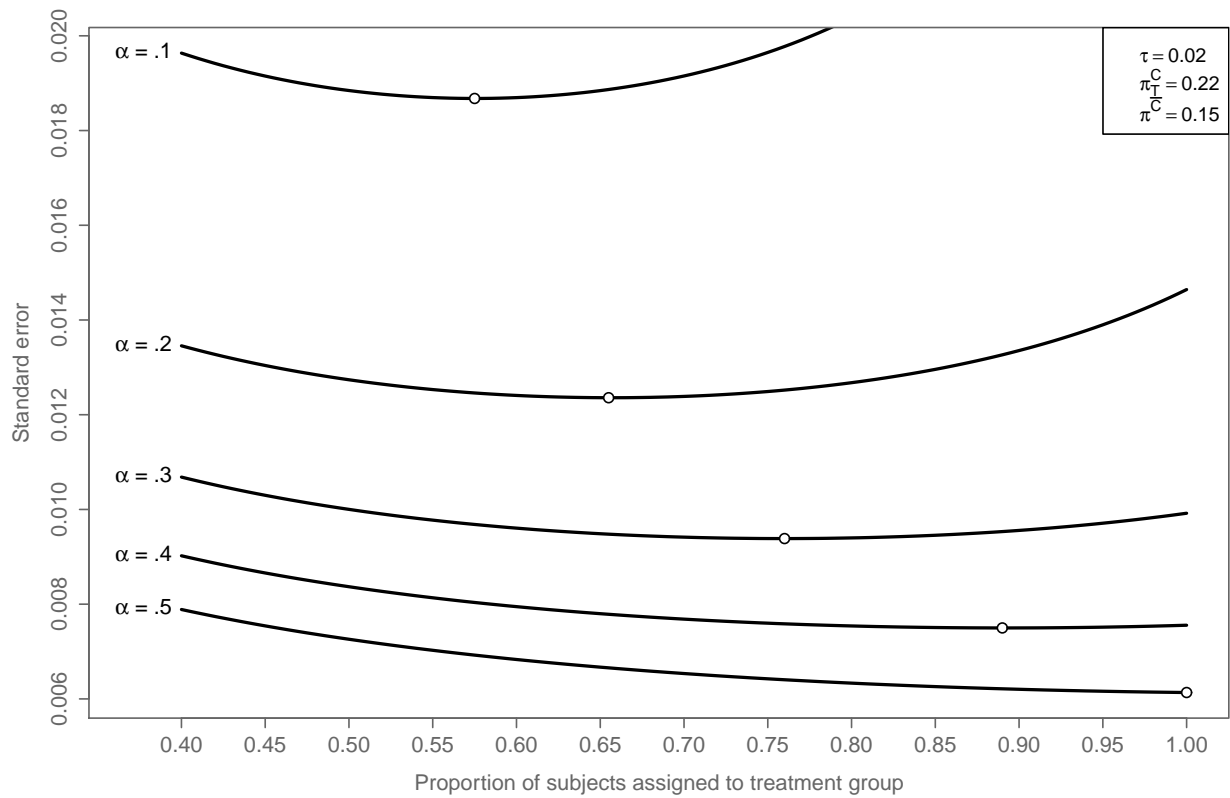


Figure 3: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

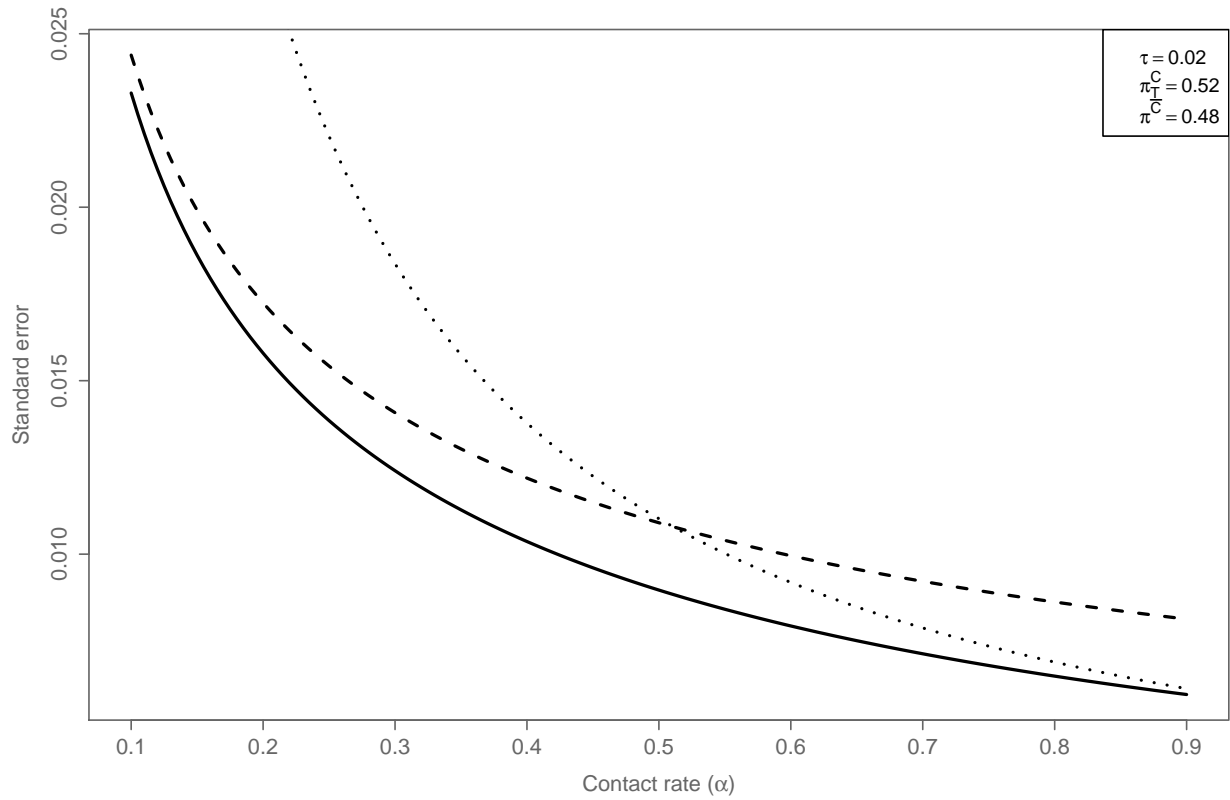


Figure 4: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

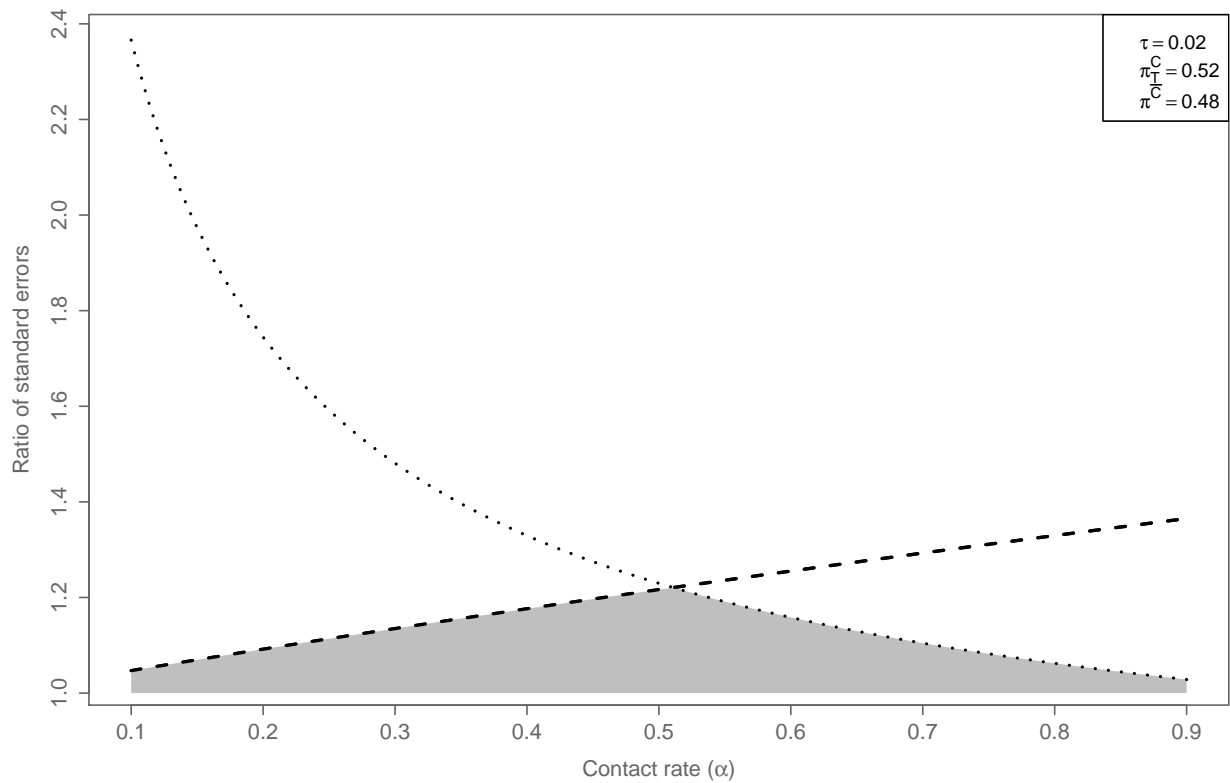


Figure 5: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

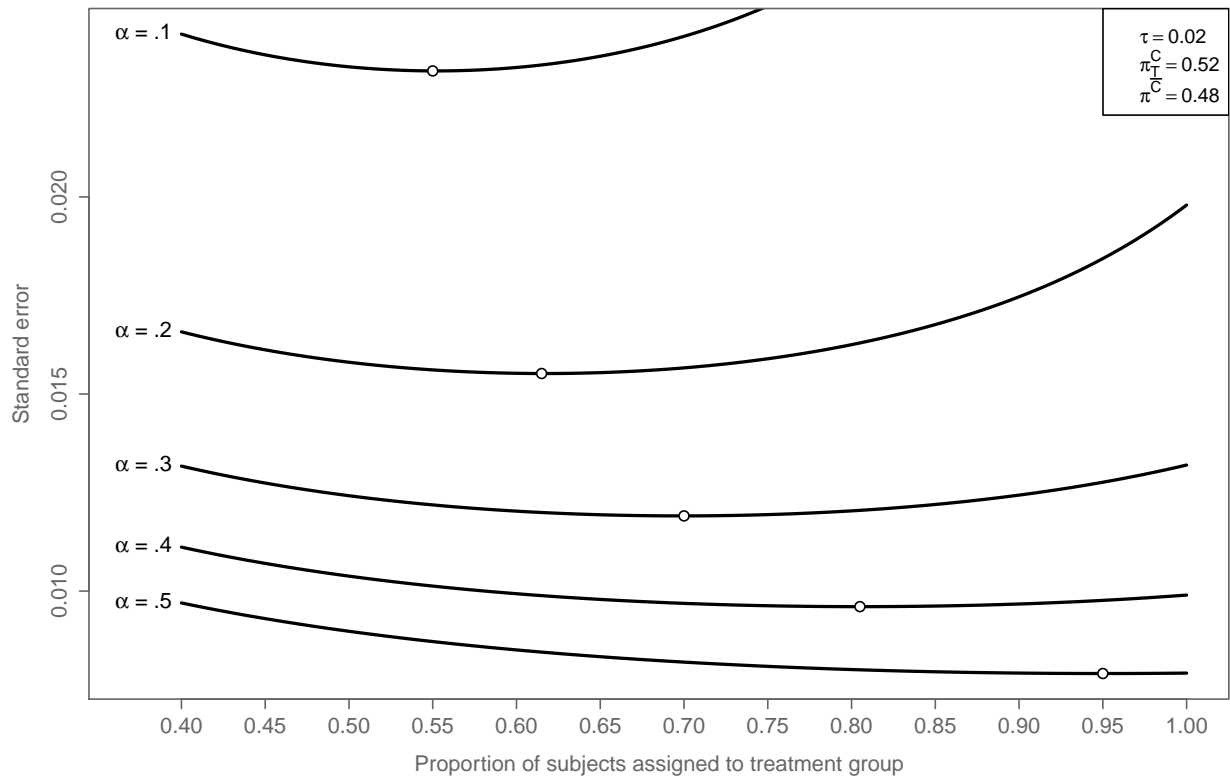


Figure 6: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

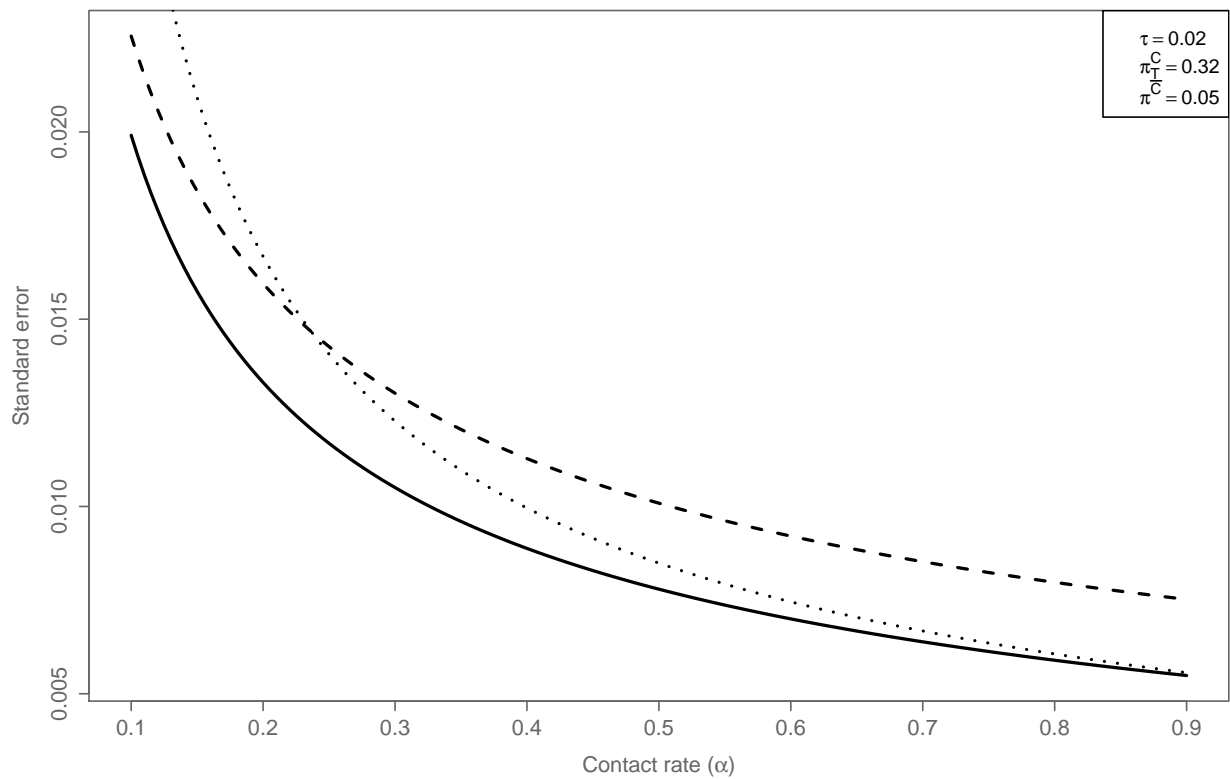


Figure 7: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

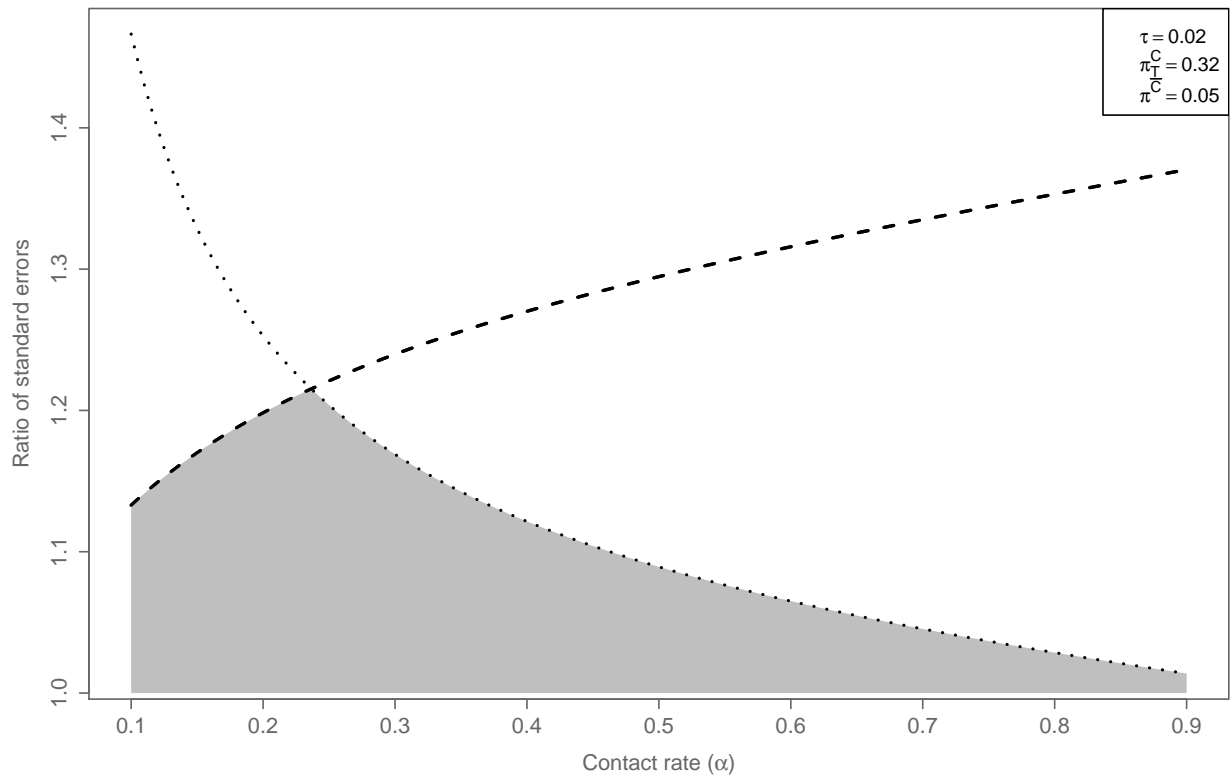


Figure 8: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

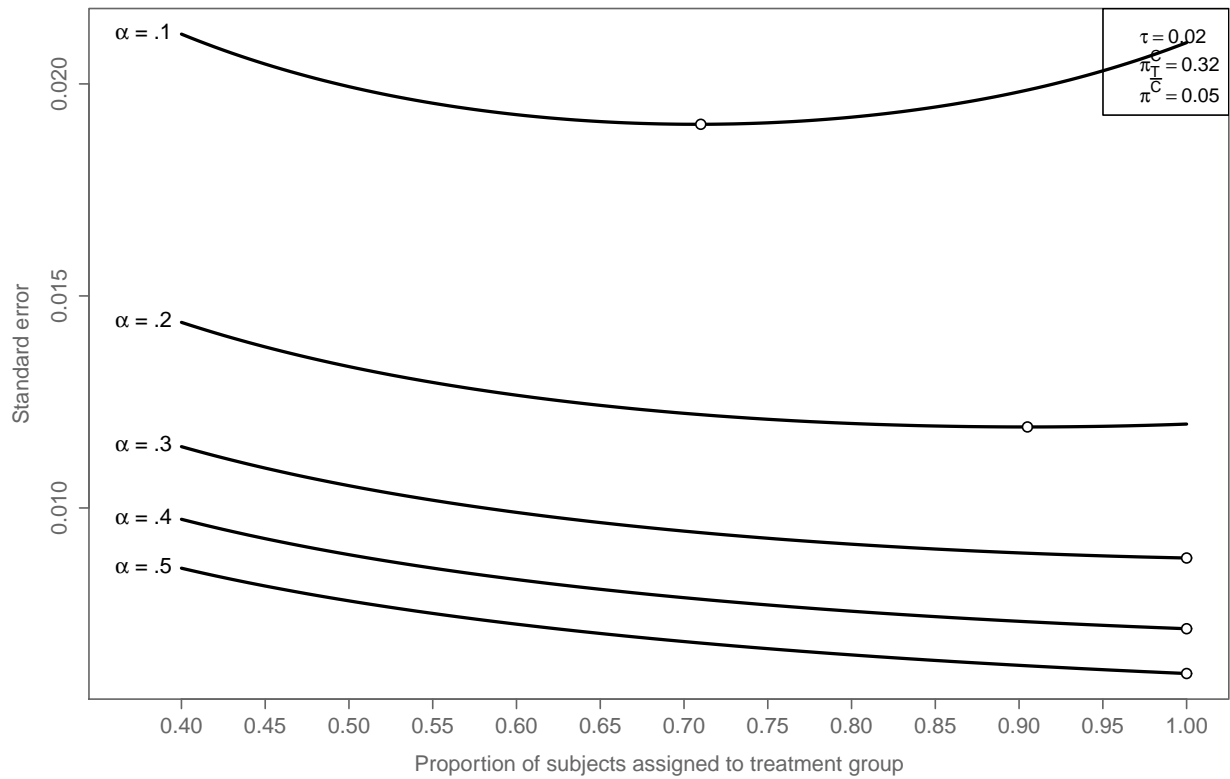


Figure 9: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

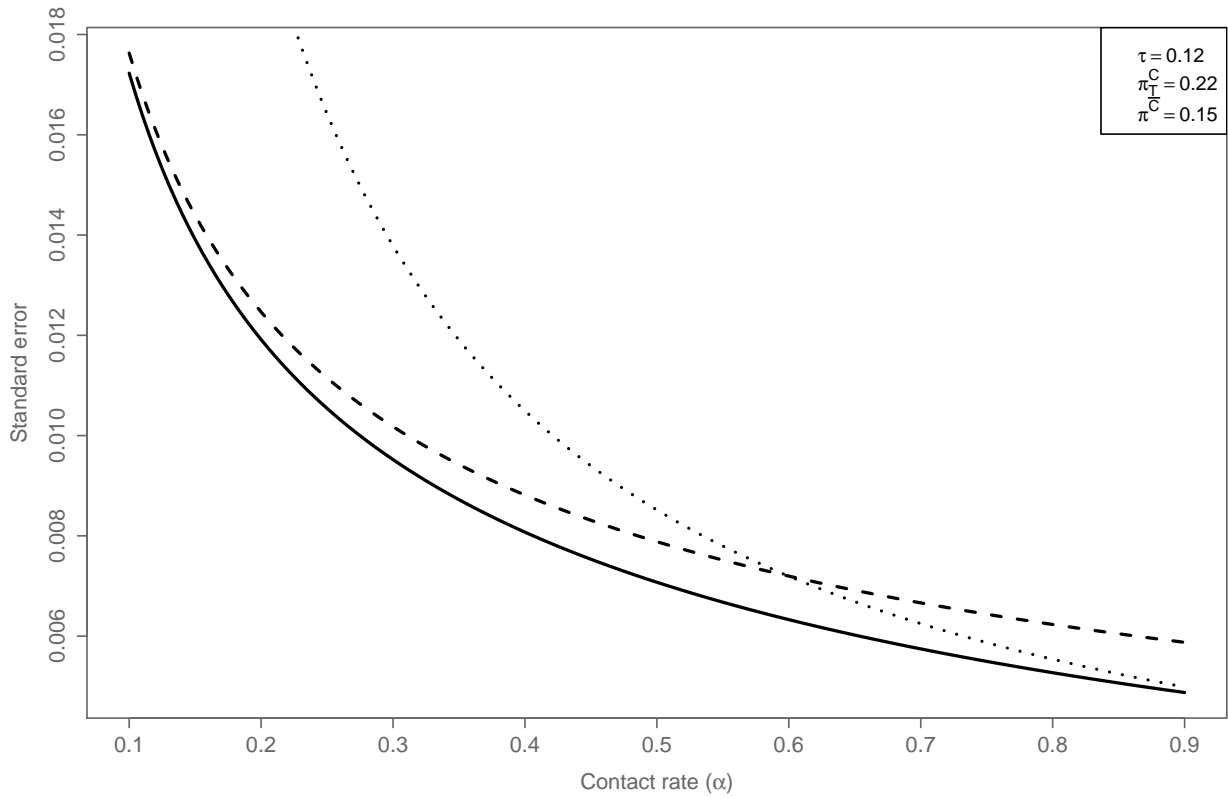


Figure 10: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

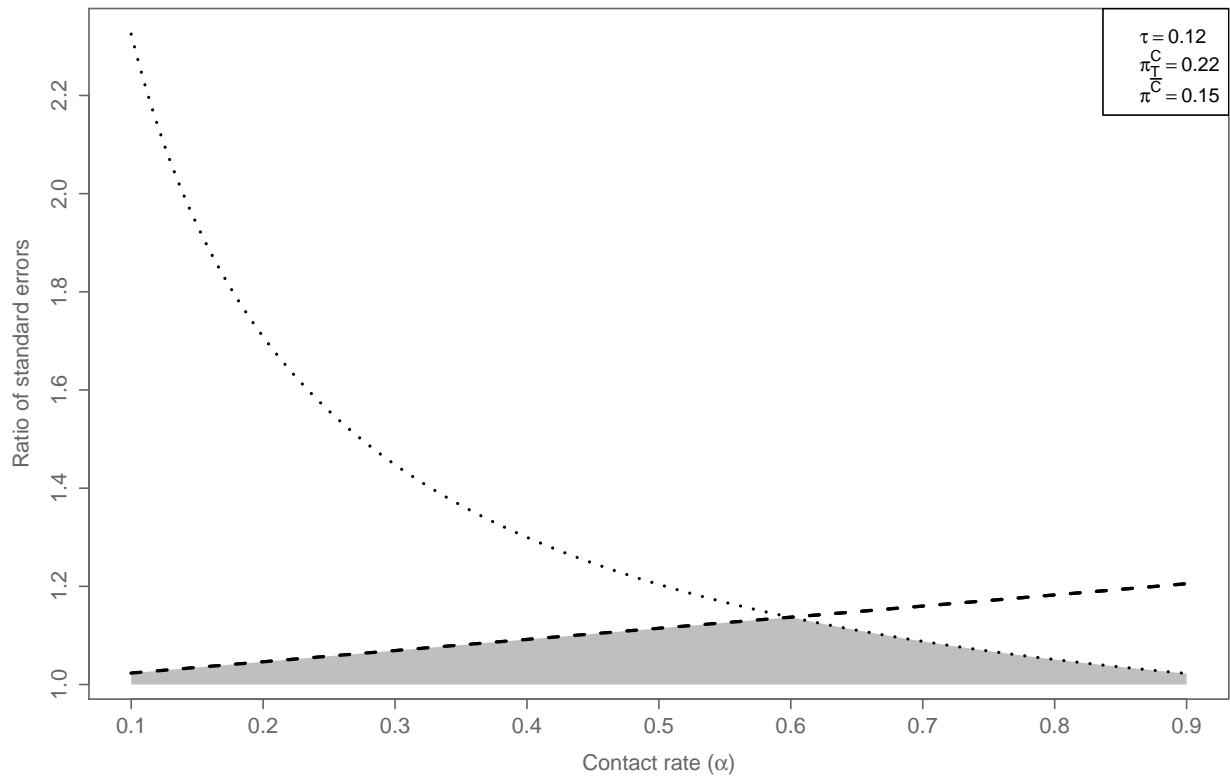


Figure 11: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

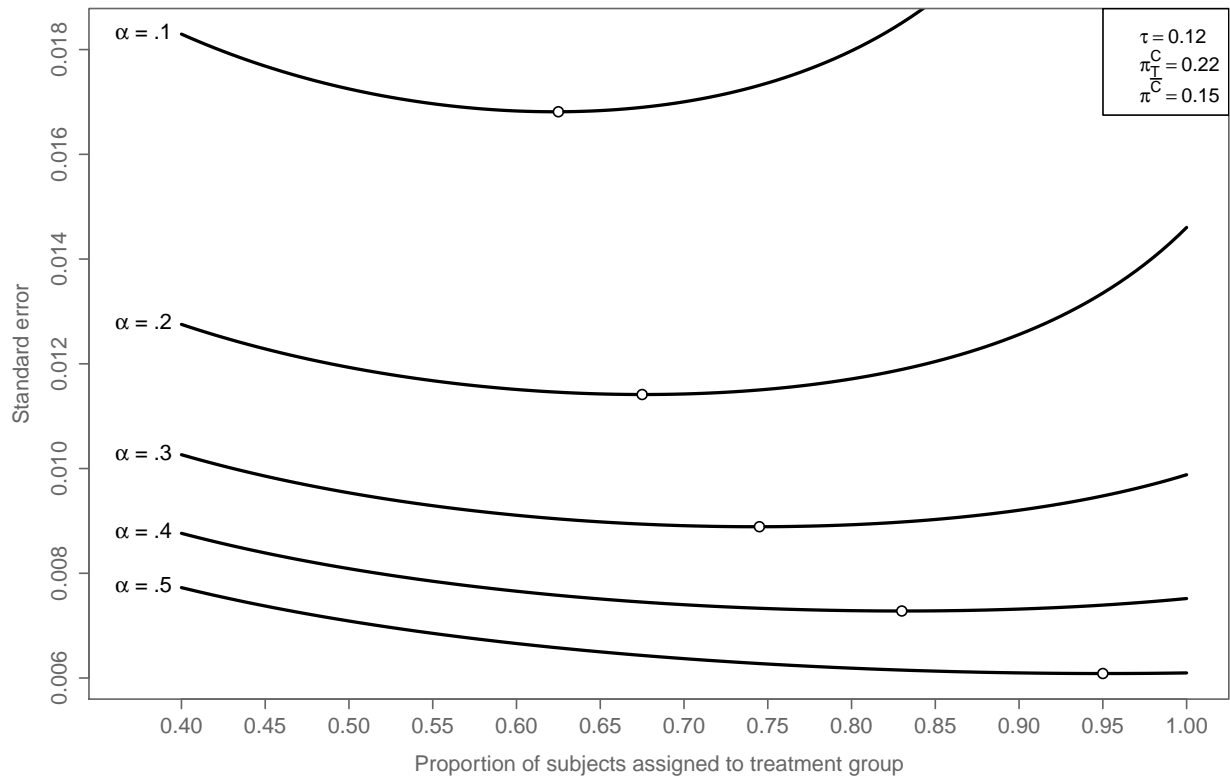


Figure 12: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

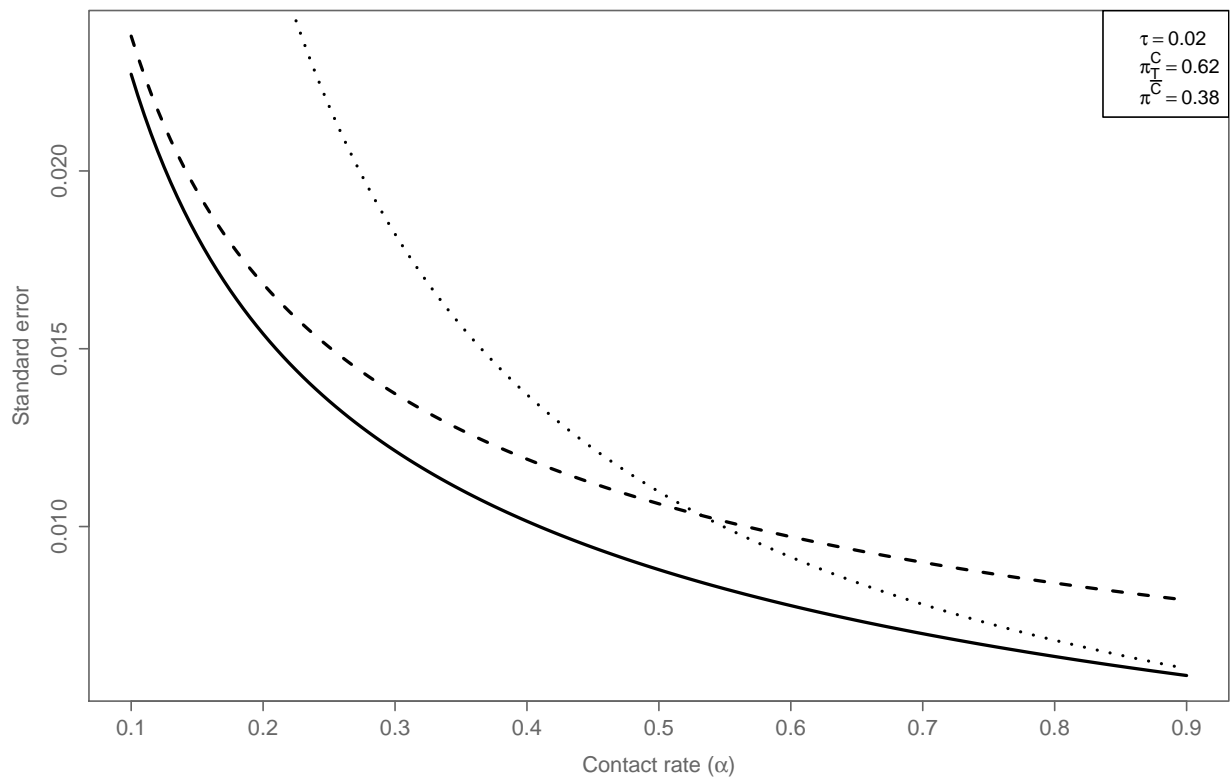


Figure 13: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

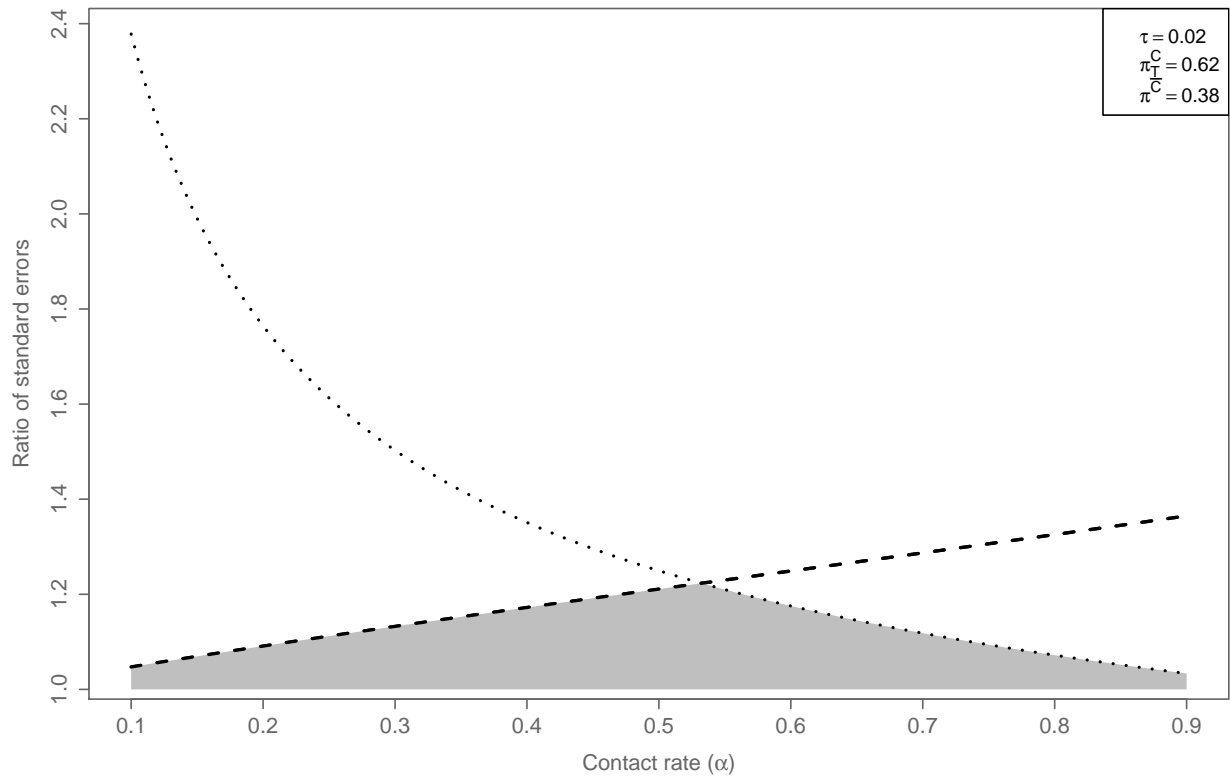


Figure 14: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

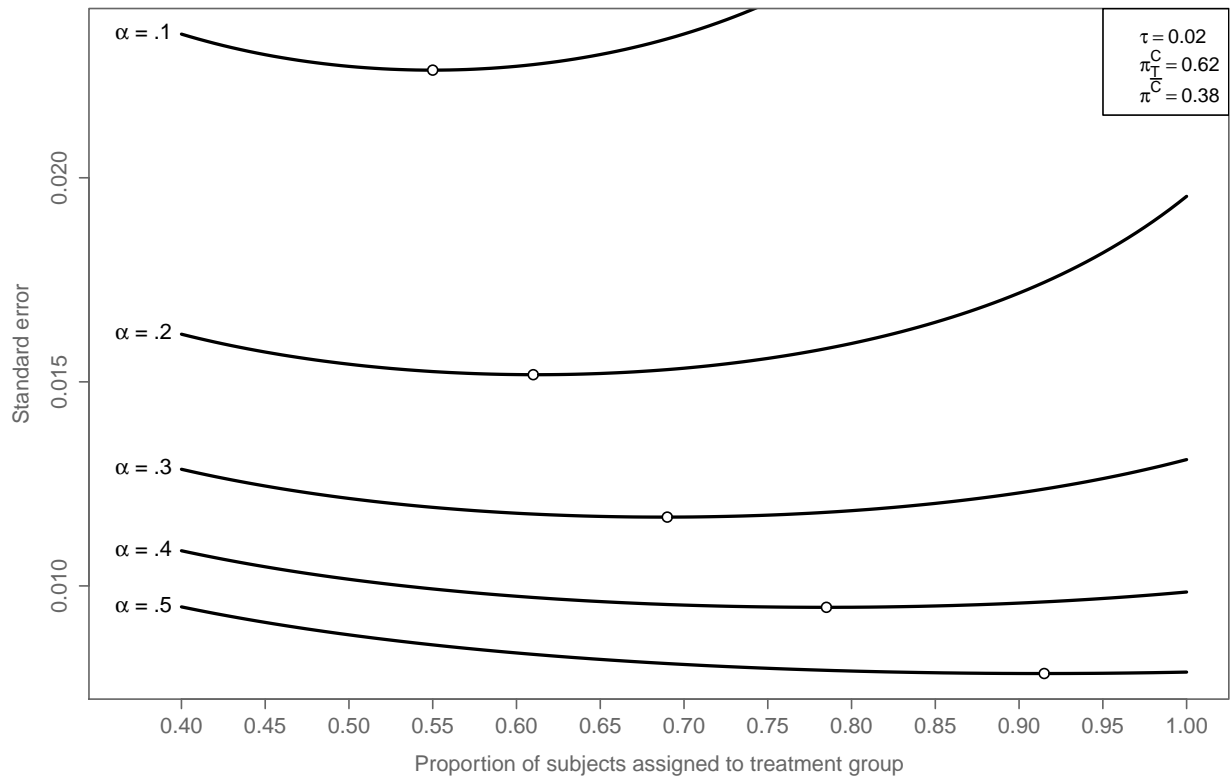


Figure 15: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

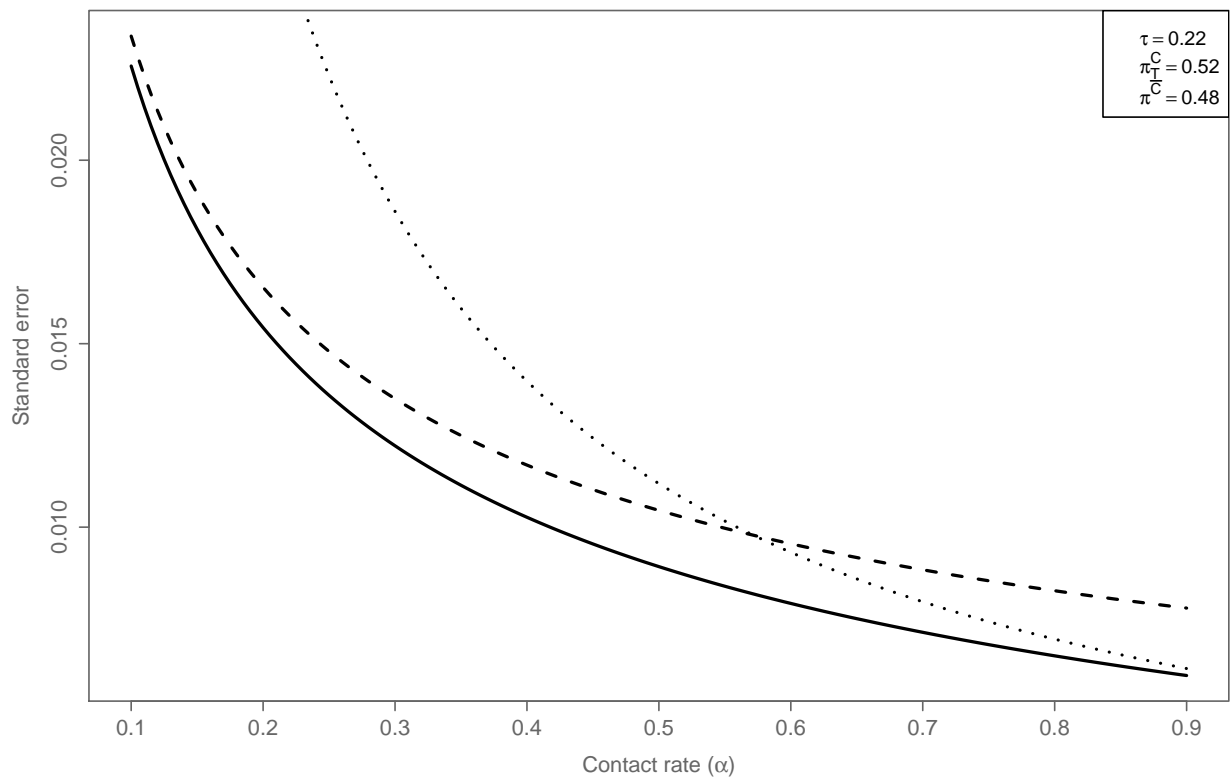


Figure 16: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

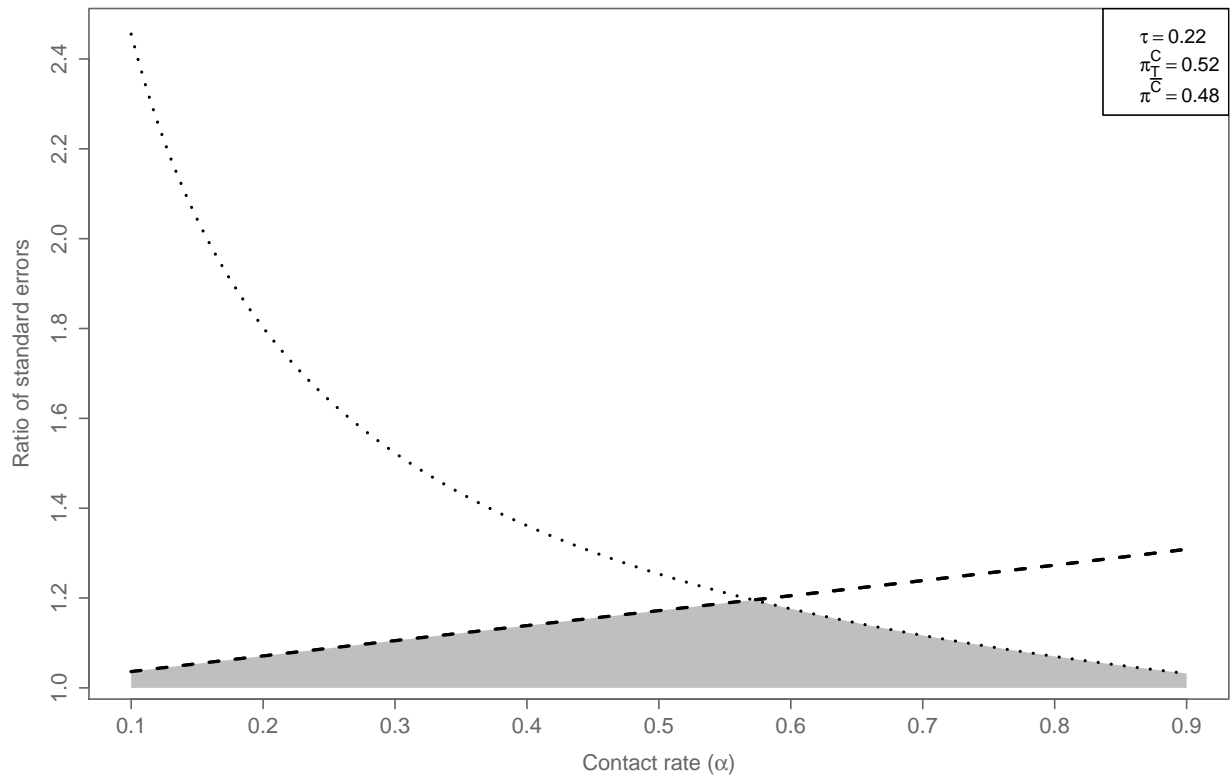


Figure 17: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

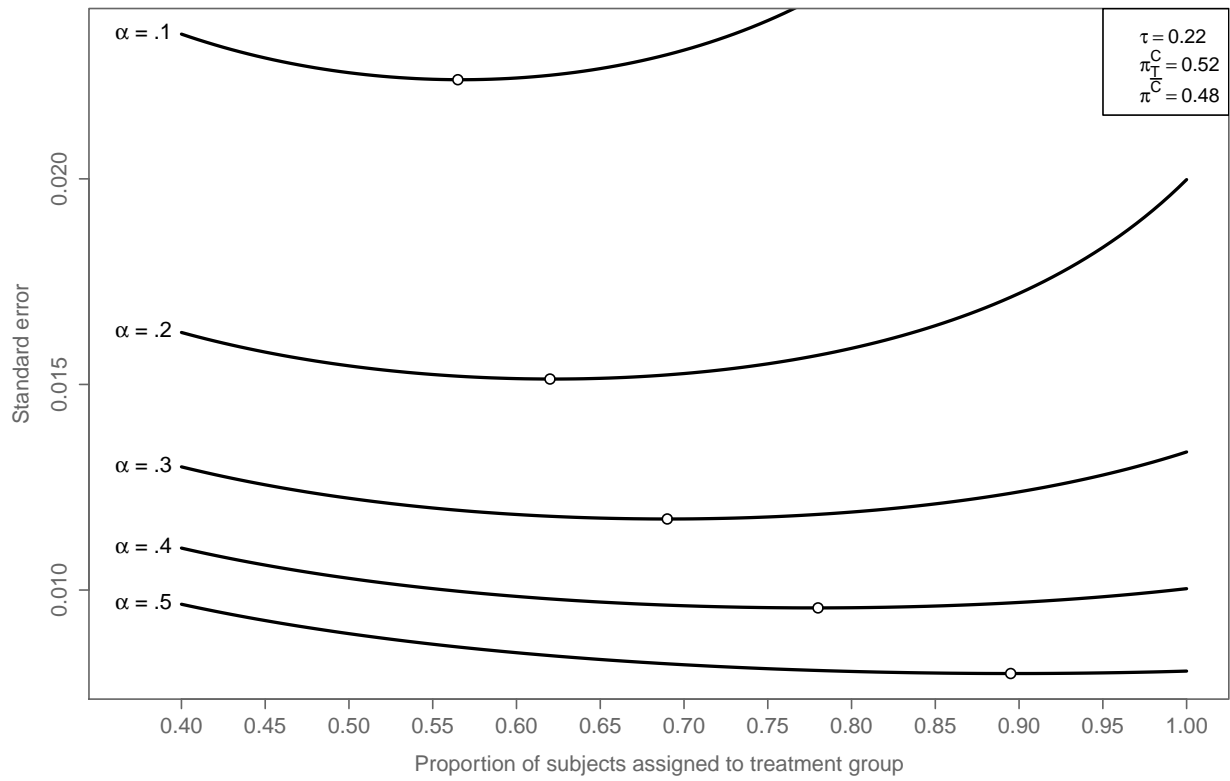


Figure 18: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

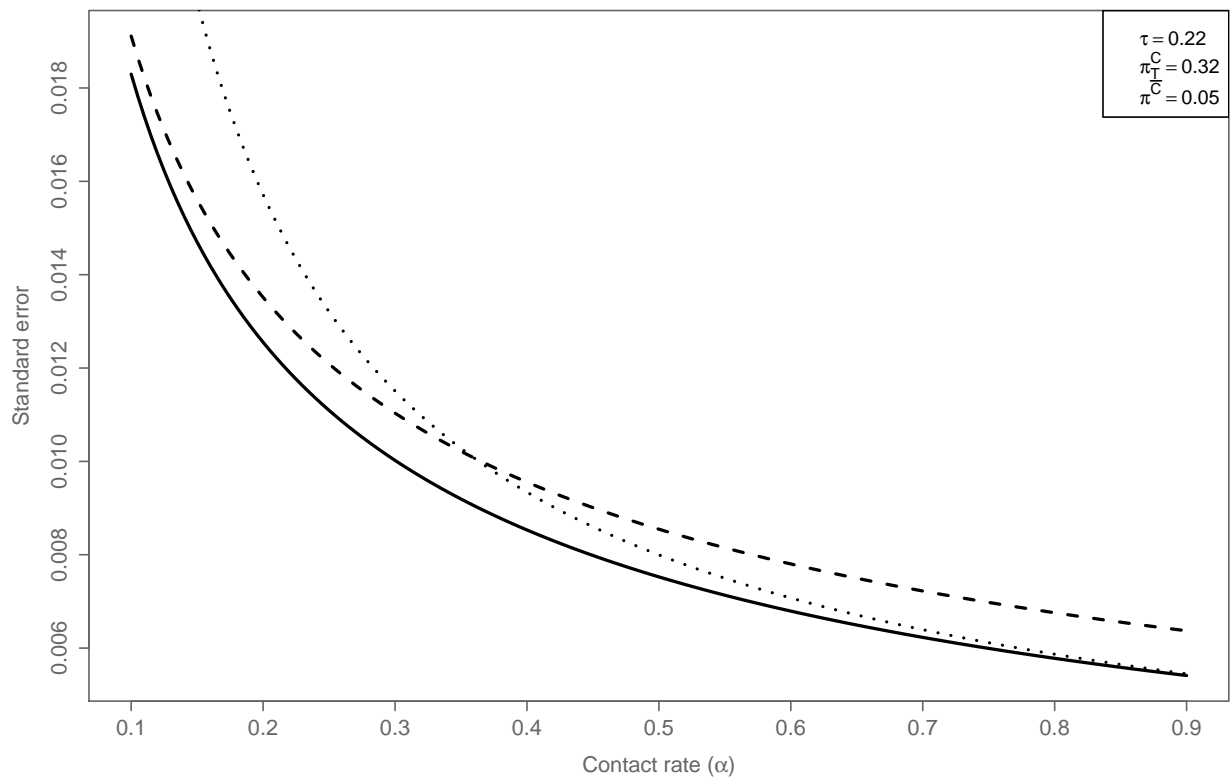


Figure 19: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

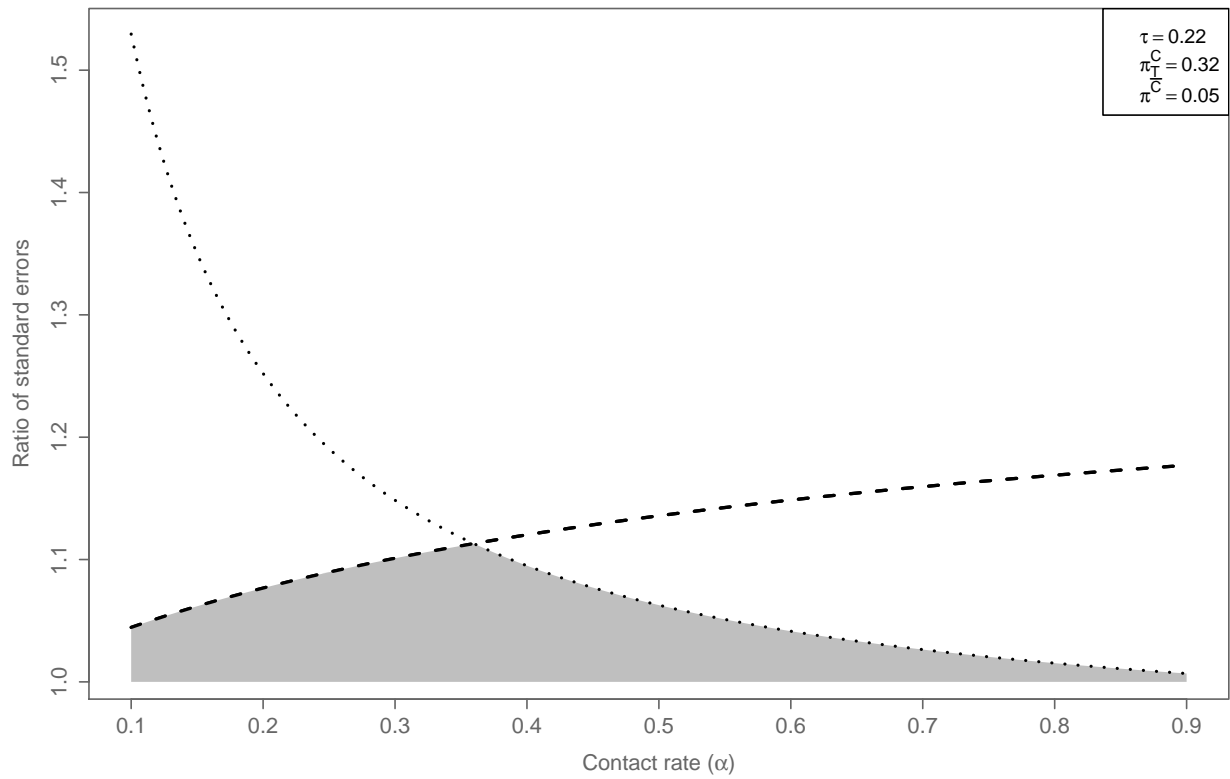


Figure 20: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

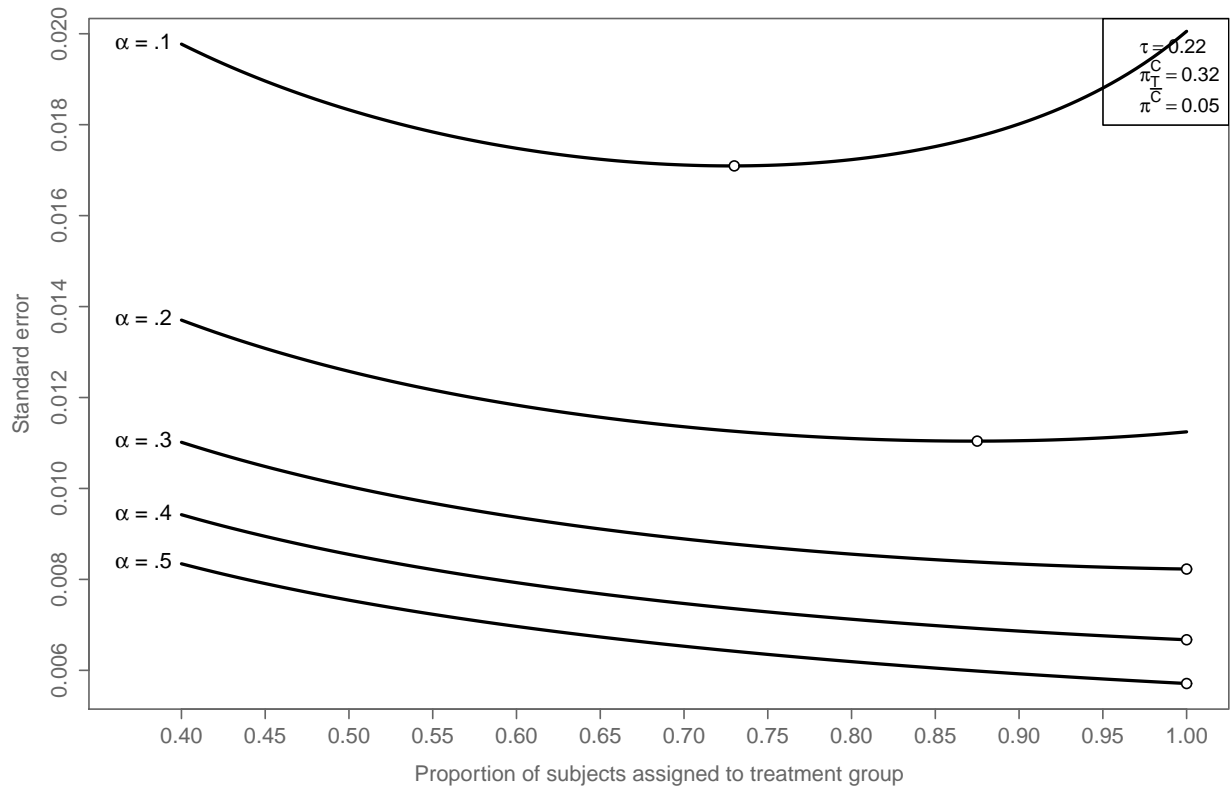


Figure 21: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

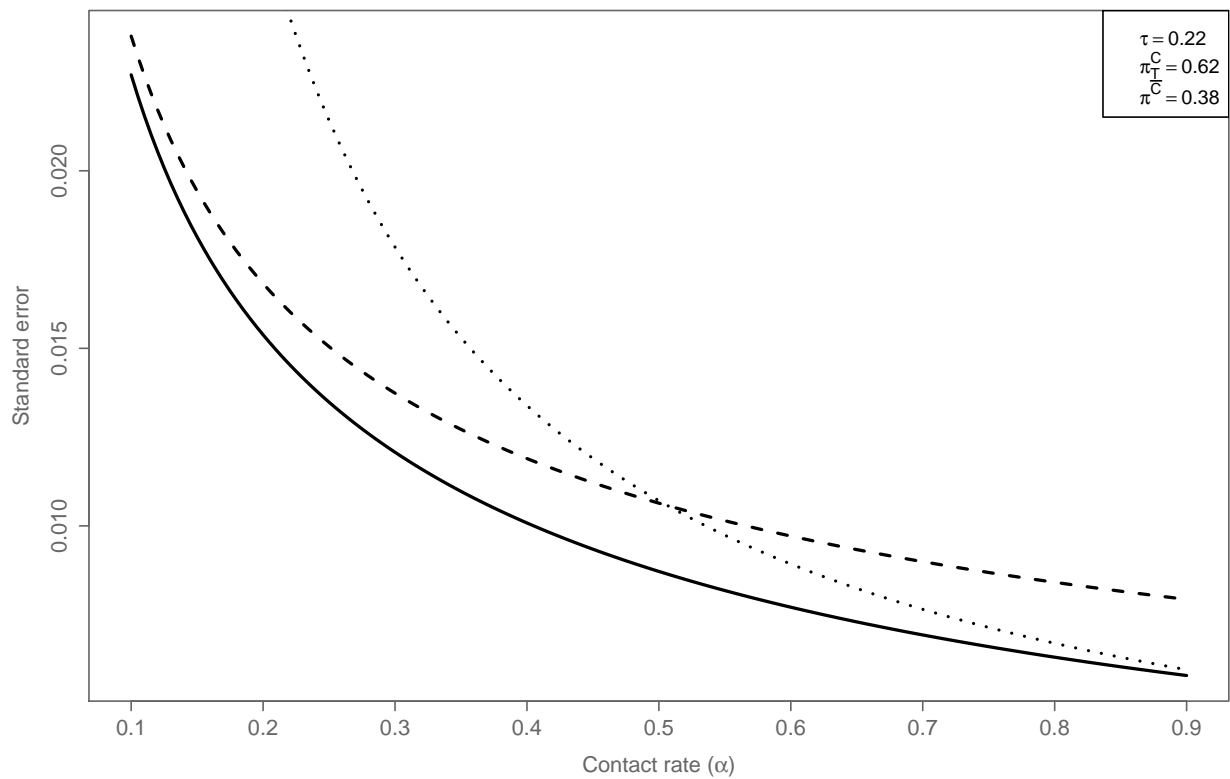


Figure 22: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

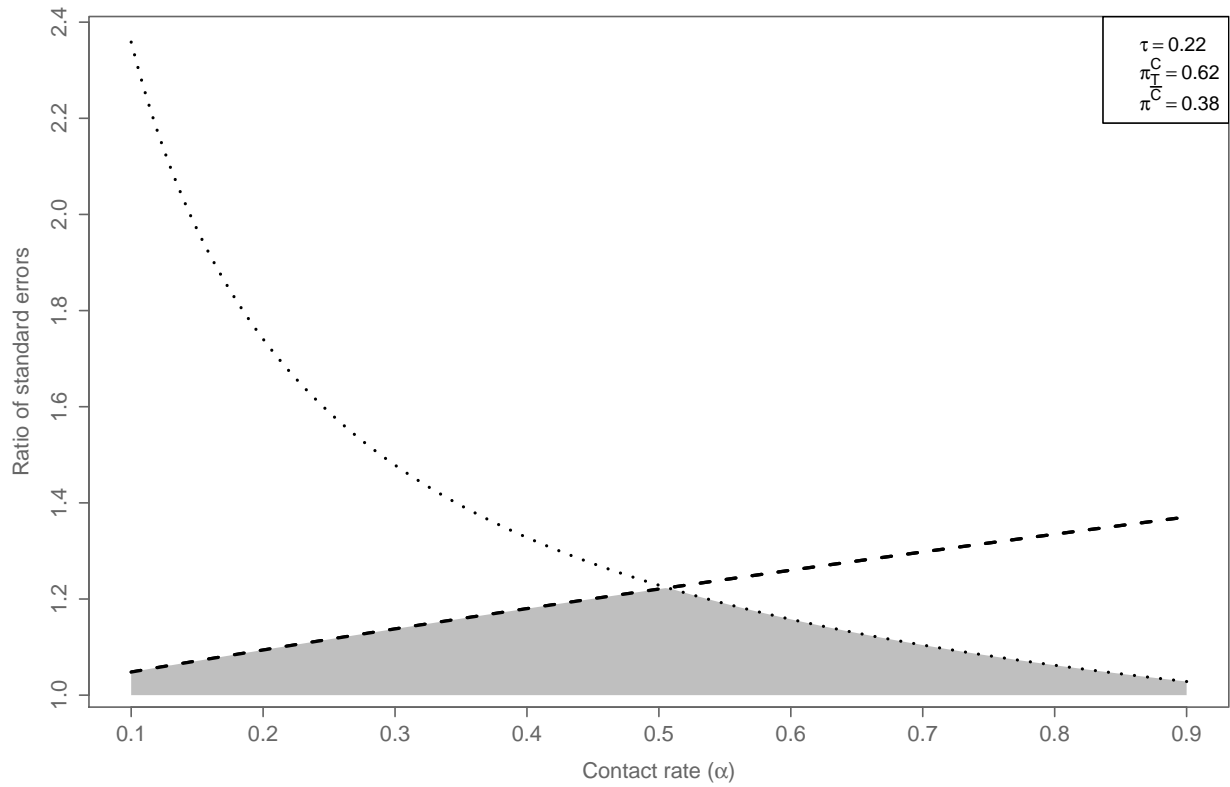


Figure 23: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

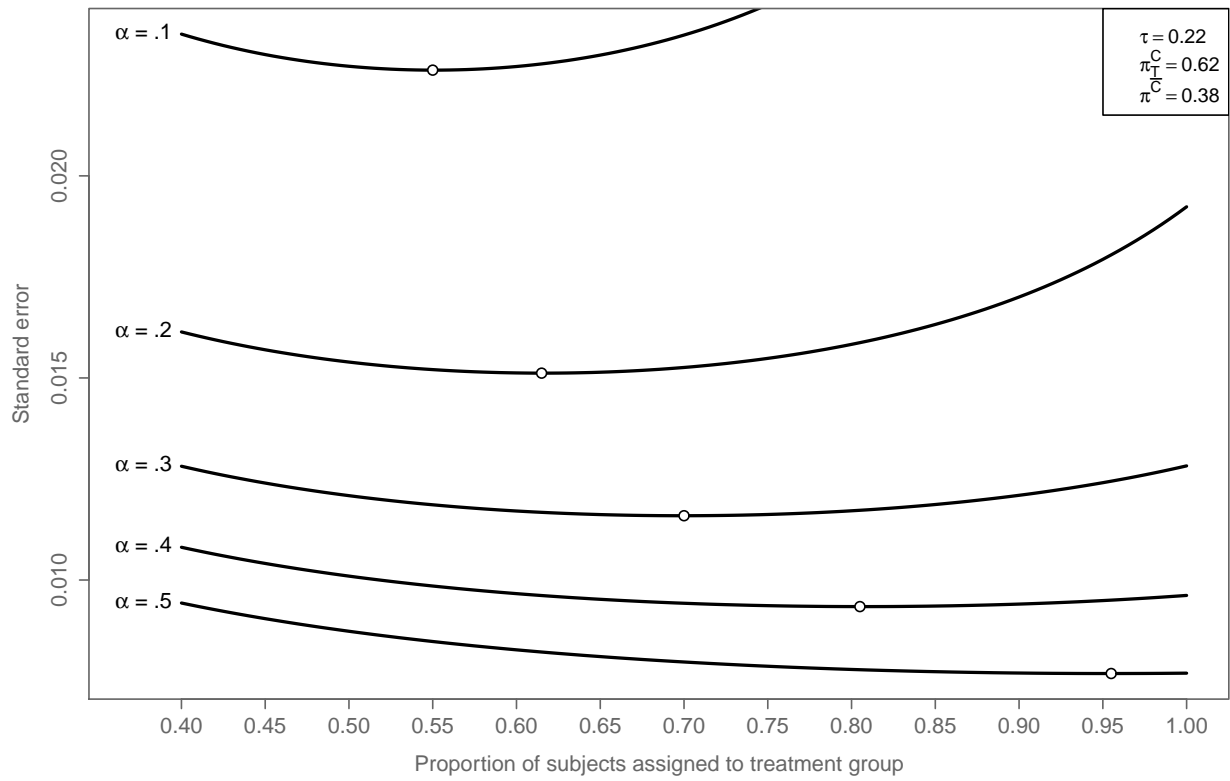


Figure 24: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

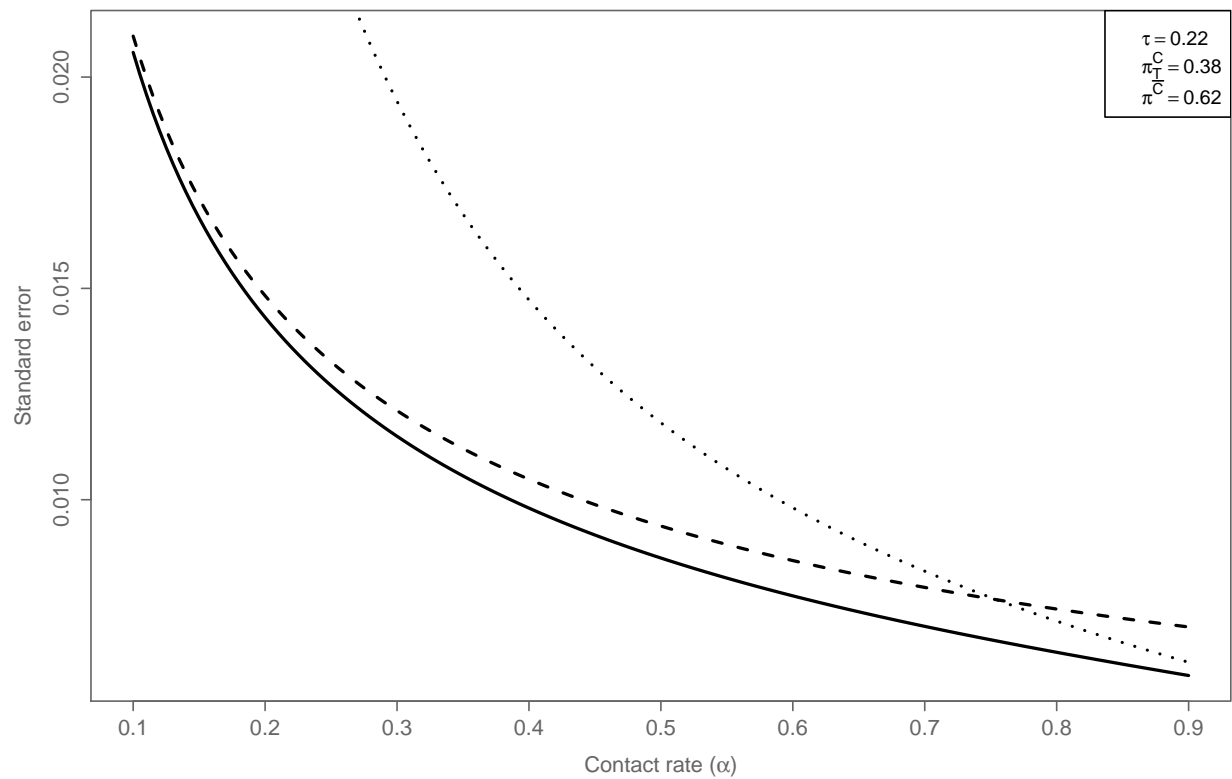


Figure 25: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

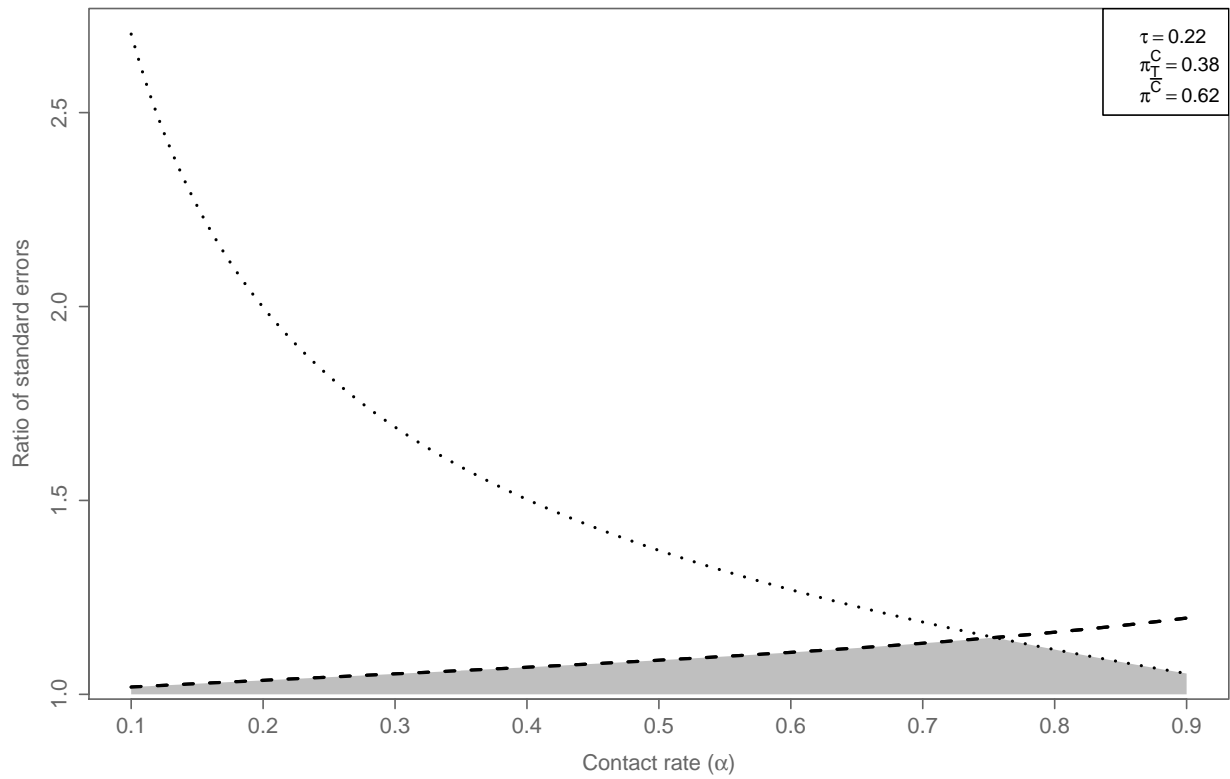


Figure 26: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

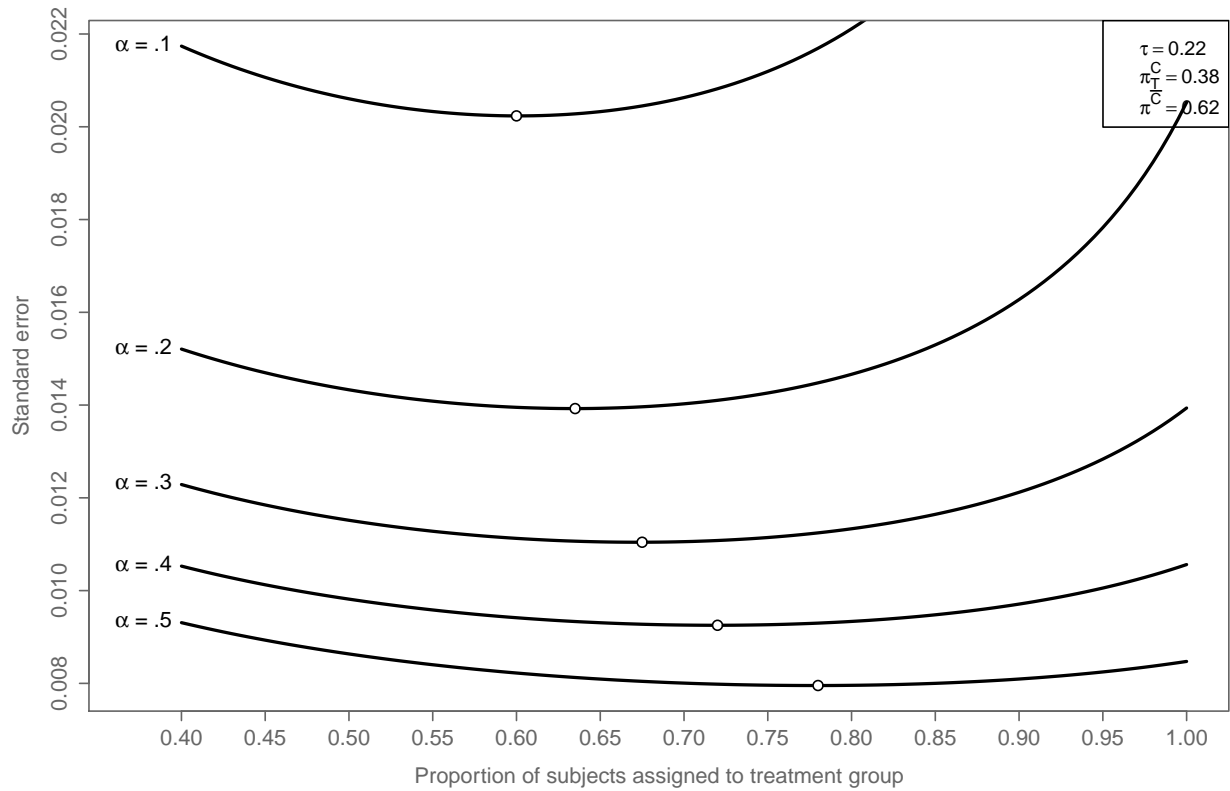


Figure 27: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.

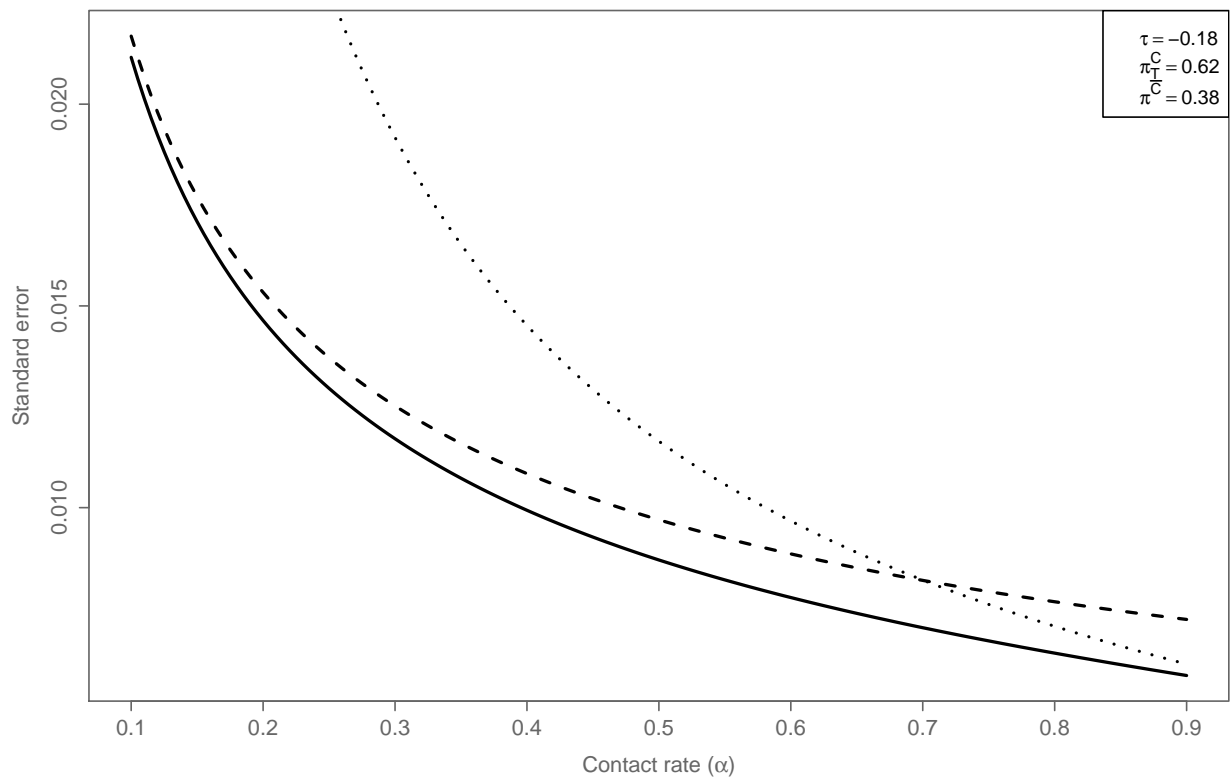


Figure 28: Estimated standard errors as a function of the contact rate

The graph shows standard errors for the estimated treatment effect from the baseline-treatment (dotted curve), placebo-treatment (dashed curve), and three-group (solid curve) designs as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

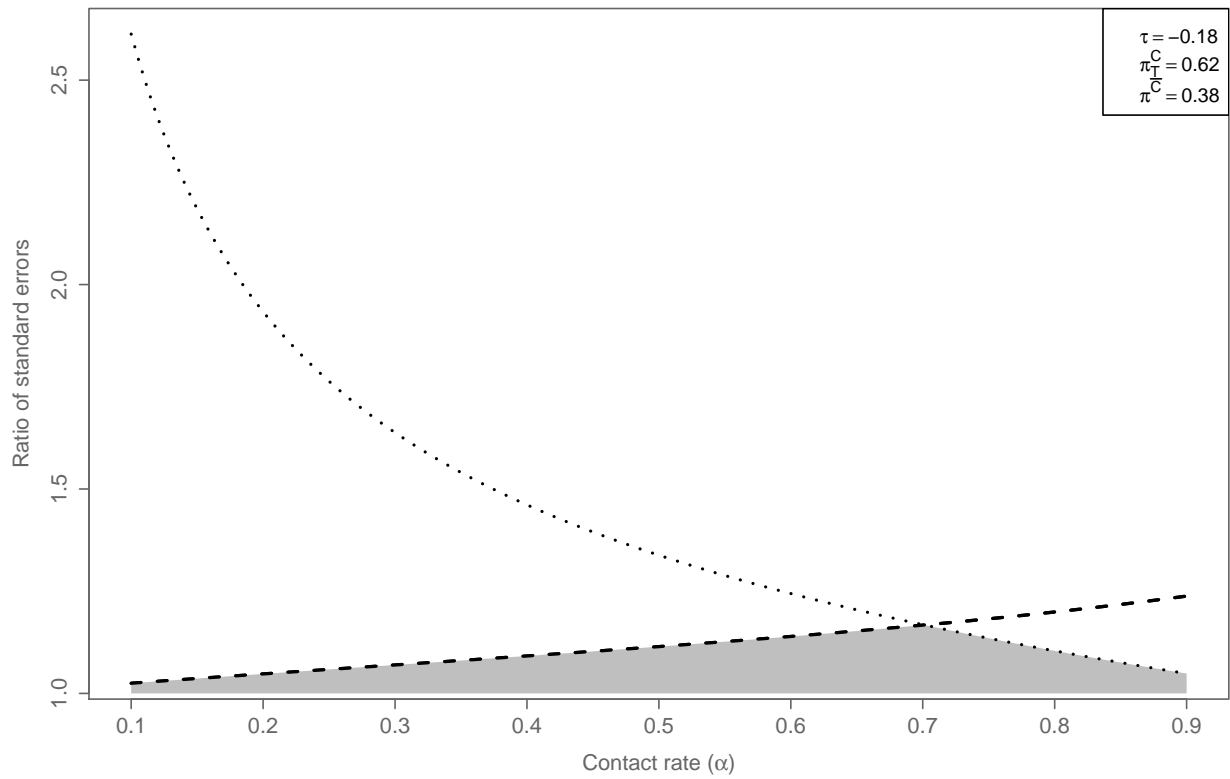


Figure 29: Ratio of estimated standard errors as a function of the contact rate

The graph shows the ratios of the standard errors for the estimated treatment effects from the baseline-treatment and three-group design (dotted curve) and the placebo-treatment and three-group design (dashed curve) as the contact rate (α) ranges from .1 to .9. The values of all other parameters are given in the topright corner.

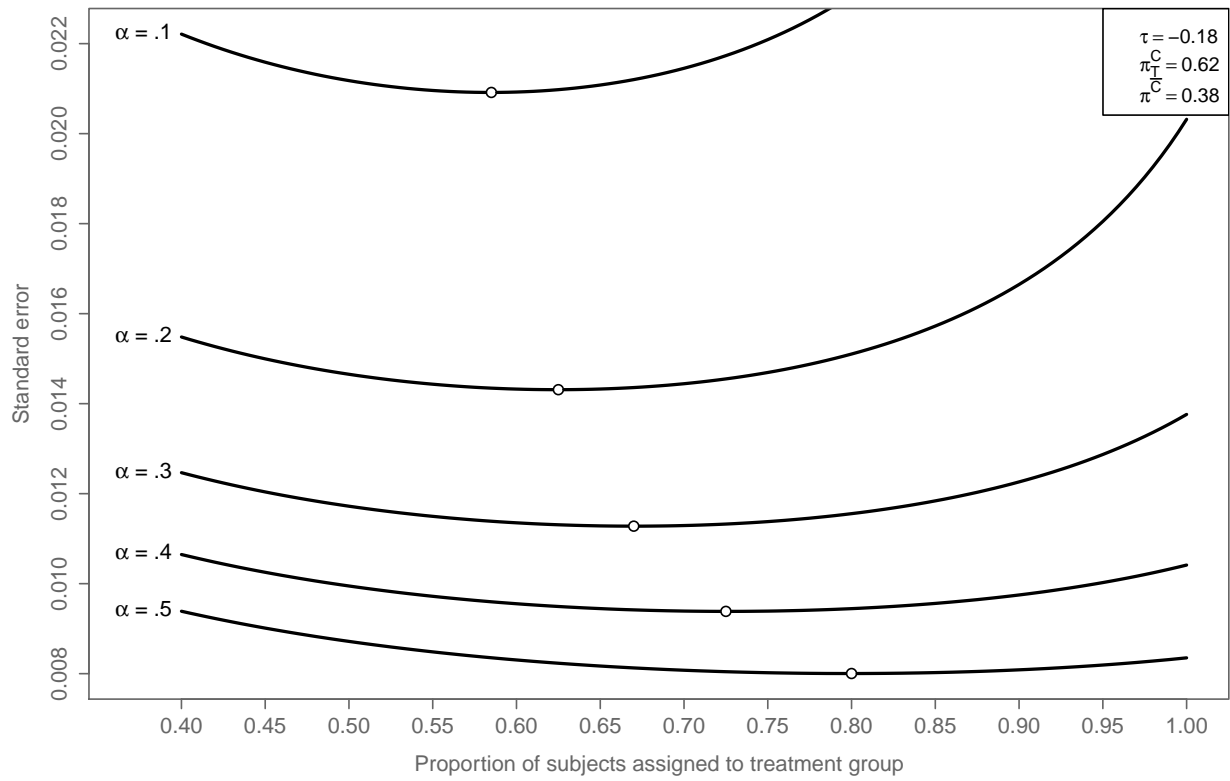


Figure 30: Estimated standard errors as a function of the contact rate and the proportion of subjects assigned to the treatment group

The graph shows standard errors for the estimated treatment effect from the three-group design for 5 different values for the contact rate (α) as the proportion of subjects assigned to the treatment group (out of the total number of subjects assigned to treatment and placebo) ranges from .4 to 1. The values of all other parameters are given in the topright corner. Empty circles denote minima.