This research aims at comparing the efficiency of the two methods used in parameter estimation, Ordinary Least Square method (OLS), and M-Estimator method using robustness of Ramsey and scale of factor determined by median absolute deviation (MAD). The two indicators employed for the comparison are capability to control probability of type I error, and power of the test. In this study the residuals are allowed to have two different long-tailed distributions, logistic distribution and scale-contaminated normal distribution when scale factor = 5, 10, 15 and percent of contamination = 5, 10, 20, 30. Number of treatment in both distributions are 3, 5, and 7. Each treatment uses sample size = 5 and 15 when number of covariate = 2, and sample size = 10 and 20 when number of covariate = 5. Significant level (α) used in the hypothesis testing are 0.01 and 0.05. Computer program employed in this study is Monte Carlo technique which each situation are repeated 1,000 times. The results of this research can be concluded as follow:

a) Probability of Type I Error

For scale-contaminated normal distribution, M-Estimator method can control probability of type I error in every situation. On the other hand, OLS method cannot control probability of type I error when number of treatment is low, sample size in each treatment is small, and sample size in each treatment is large with high scale factor regardless of number of covariate and percent of contamination. For logistic distribution, both methods can control probability of type I error in all situation.

In sum, increasing sample size, number of treatment, and significant level will improve capability to control probability of type I error for both estimation methods, and in both types of residuals' distribution.

b) Power of the Test

For scale-contaminated normal distribution, M-Estimator method has higher power of the test than OLS method has in the case of small sample size, and for large sample size with high scale factor and higher percent of contamination. Furthermore, power of the test of both methods have inverse relation with scale factor and percent of contamination. In case of logistic distribution, M-Estimator method is better than OLS method in yielding power of the test for small sample size.

Conclusively, for all residuals' distribution in this research power of the test of OLS and M-Estimator methods vary according to sample size in each treatment and significant level. On the other hand, they have inverse relation with number of treatment, and the rate of increasing power of the tests vary with number of covariate.