

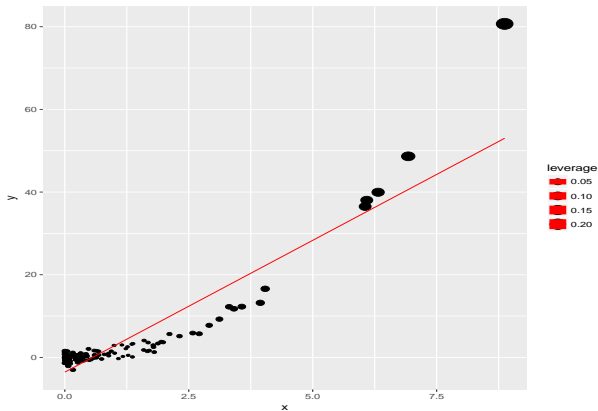
Assignment 3

ECN 240A

6PM

February 1, 2018

x-y plot with leverage



1. The x 's that are far from the mean have higher leverages;
2. The higher leverage x 's will bend the fitted line towards them

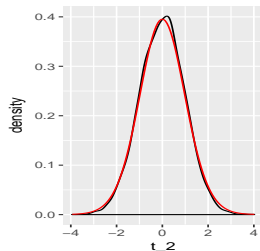
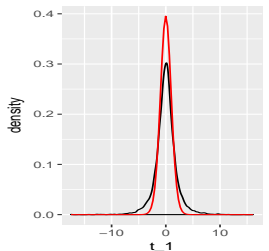
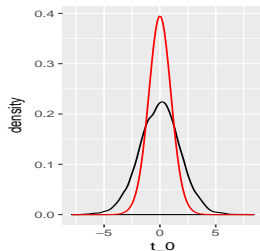
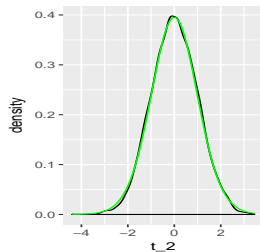
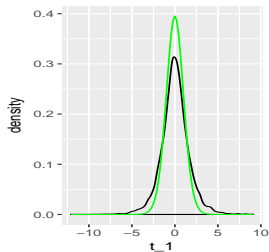
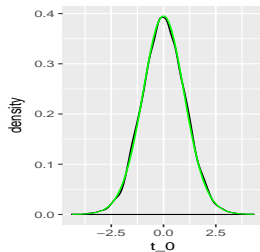
Monte Carlo Results for Robust Standard Error Estimates

	Heteroskedastic DGP	Homoskedastic DGP
mean_beta	-0.002	0.006
sd_beta	0.582	0.606
mean_v_const	0.332	0.602
sd_v_const	0.052	0.081
mean_v_HC1	0.452	0.483
sd_v_HC1	0.220	0.203
mean_v_oracle	0.593	0.609
sd_v_oracle	0.000	0.000
reject_const	0.249	0.047
reject_HC1	0.201	0.172
reject_oracle	0.036	0.039

Some Comments

1. Under correct specification for CEF, we have unbiased $\hat{\beta}_1$.
2. Under homoskedasticity, the conventional s.e estimate is unbiased and the corresponding t-ratio has the correct rejection rate, while the HC1 s.e estimate is biased, and its t-test will over-reject the null hypothesis.
3. Under heteroskedasticity, these two methods both under-estimate the s.e, and their corresponding t-tests over-reject the null.
4. It seems the conventional one is worse under heteroskedasticity, while the HC1 one is the expedient in this case.
5. We did the degree-of-freedom adjustment for the oracle s.e estimator, but it seems to be far away from the conventional one under homoskedasticity, so we didn't adjust.

Empirical t Distribution vs. Theoretical t Distribution



Some Comments

1. The first row shows the homoskedasticity case, and the second row shows the heteroskedasticity case;
2. The first column shows the t-distribution using conventional s.e estimate, the second column uses HC1 option and the last column is the benchmark (HC1 oracle).
3. The colored curves are the true t-distributions, while the black ones are the empirical ones.
4. It seems that under homoskedasticity, the t-distribution with conventional s.e estimate is almost identical to the theoretical distribution, while the HC1 method causes fatter tails.
5. Under heteroskedasticity, the empirical t-distributions both have fatter tails, but the conventional method has much fatter tails.

Conclusion

Using HC1 oracle method, we can see the empirical distributions of t-ratio in these two cases are both close to the theoretical t-distribution. This implies that the t-distribution is a good approximation of the distribution of t-ratio even under heteroskedasticity. So from the results above, we can conclude that the biasedness of s.e estimator is problematic.