240A Computing Assignment III

Surplus Value

University of California, Davis

February 2nd, 2018

X-Y Plot with Leverage

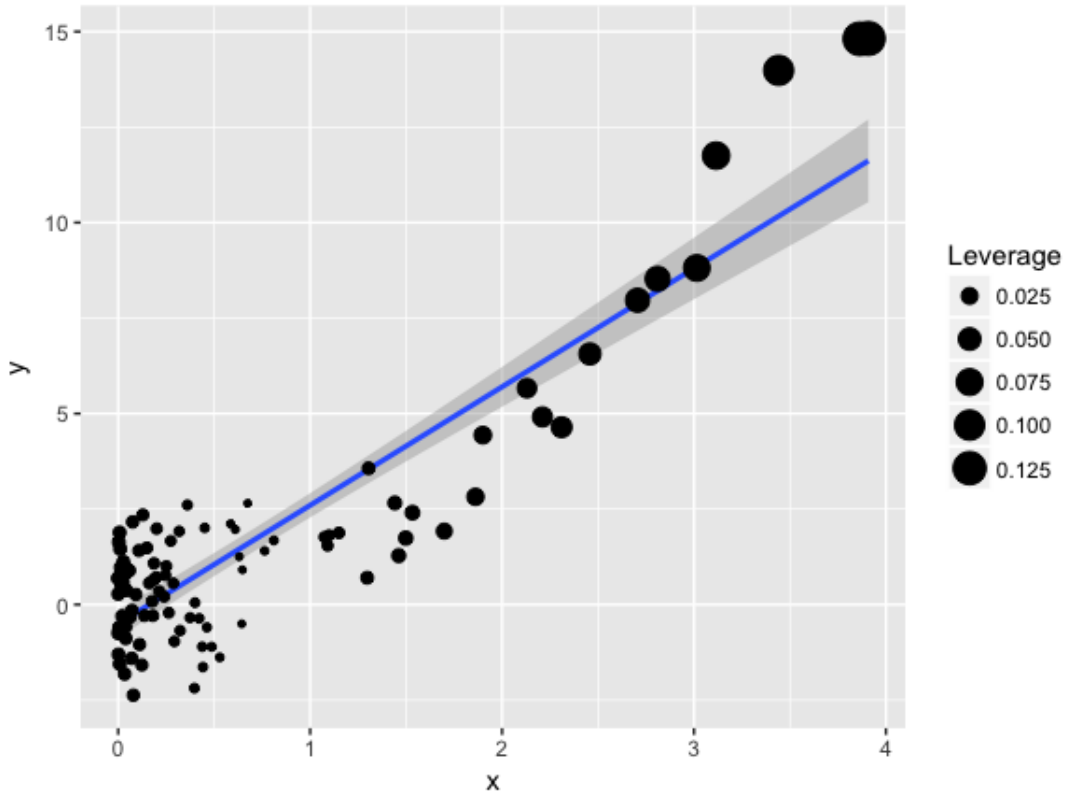

Figure – Chi-Square DGP (seed 12345) with linear projection and scatter plot where the size of the dots represent leverage.

The mean is equal to 0.66. Therefore, the dots are smaller for the observations that are closer to the mean and larger for the observations that are further away.

Distribution of OLS Estimator I

Parameter Estimate	Mean	Std. Deviation	Emp. Rej. Rate (t)
$\hat{\beta}_1$	-0.006	0.603	
Conventional	0.602	0.081	0.048
HC1	0.484	0.203	0.168

Table – Homoskedastic DGP

Parameter Estimate	Mean	Std. Deviation	Emp. Rej. Rate (t)
$\hat{\beta}_1$	-0.006	0.603	
Conventional	0.332	0.052	0.2562
HC1	0.449	0.219	0.2084

Table – Heteroskedastic DGP

Distribution of OLS Estimator II

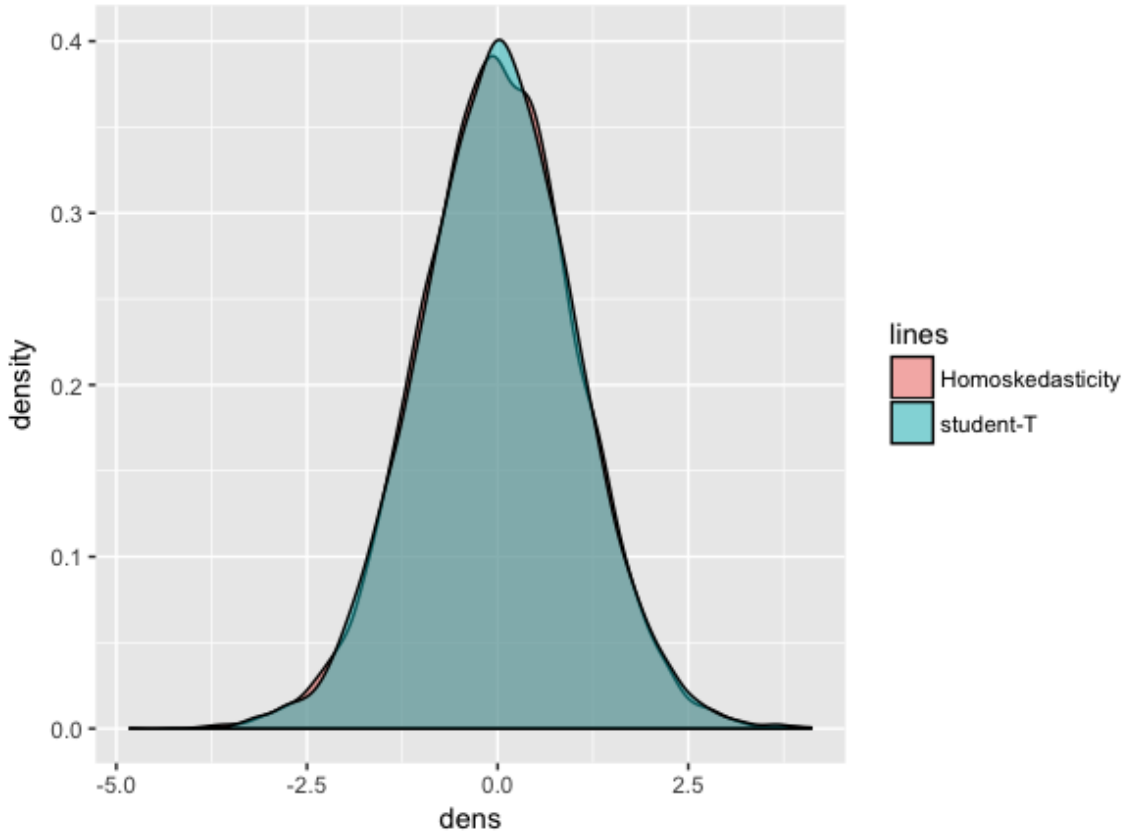

Figure – Conventional Var-Cov with Homoskedasticity

When the variance of the errors is constant (homoskedastic) and we use the conventional (non-robust) standard errors, our estimator is unbiased and efficient.

Distribution of OLS Estimator III

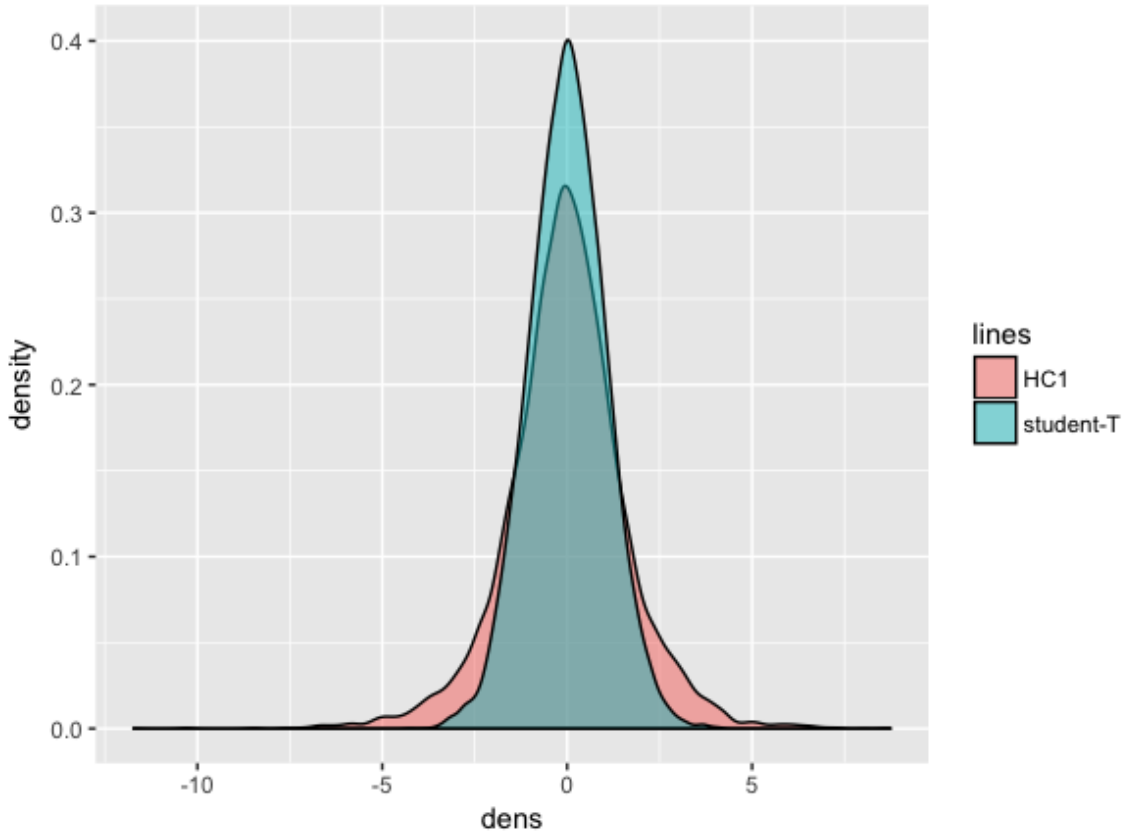

Figure – HC1-Variance with Homoskedasticity

When the DGP is homoskedastic and we use the HC1 standard errors, our estimator is inefficient ; this shows that conventional Var-Cov is preferred if the DGP is homoskedastic.

Distribution of OLS Estimator IV

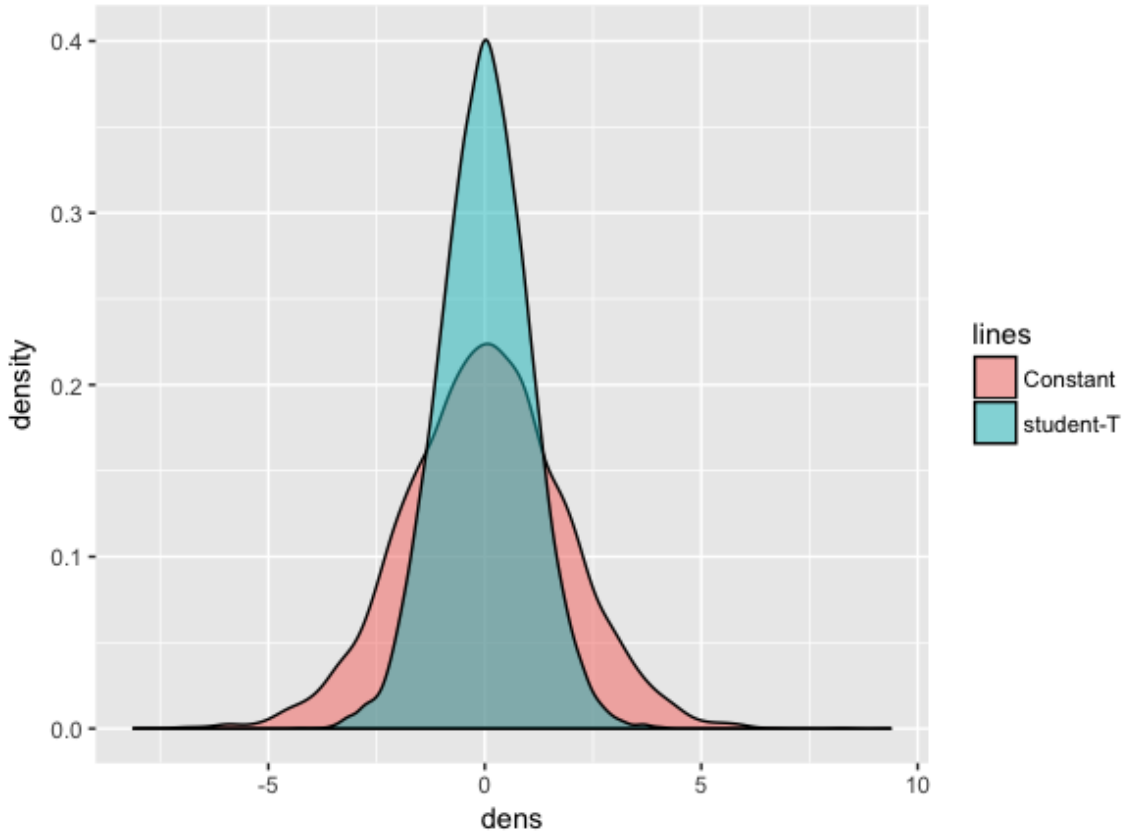

Figure – Conventional Var-Cov with Heteroskedasticity

When the DGP is hetereoskedastic, OLS estimator is inefficient when using Conventional Var-Cov. The standard errors are underestimated and the t-test is overestimated.

Distribution of OLS Estimator V

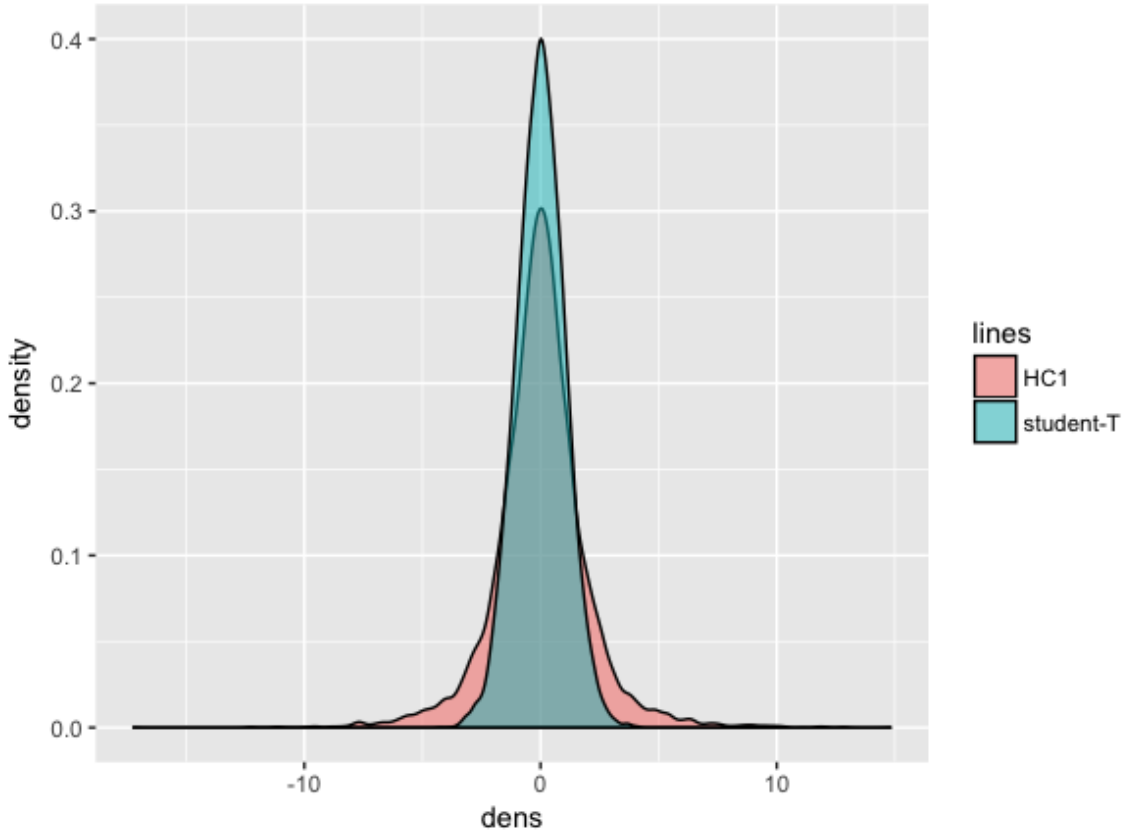

Figure – HC1-Variance with Heteroskedasticity

When heteroskedasticity is present and we correct for it (using HC1), inference predictions are more precise than when using conventional Var-Cov.

Distribution of OLS Estimator VI

In summary, a potential bias may arise either from :

- A bad estimation of standard errors, e.g. :
  - HC1-Variance with homoskedastic DGP
  - Conventional Var-Cov with heteroskedasticity DGP
- A wrong estimation of the standard errors implies a bad approximation of the t-test distribution.
- The DGP also can influence our inference precision
  - E.g. when the DGP is heteroskedastic.