1 Multicollinearity

What is multicollinearity (MC)?

- Multicollinearity is multivariate correlation amongst the explanatory variables
  - Perfect MC: Violates a classical assumption & OLS can't be calculated
  - Imperfect MC: Typical case, no violation of classical assumptions

Consequences (of imperfect MC)

- OLS is still B.L.U.E.
- Estimates can be unreliable and imprecise
- High standard errors
- Low t statistics
- Can still have high R^2 value

Detection

- Low t statistics & high R^2 value
- Pairwise correlations: $-1 \leq r_{ij} \leq 1$
  - Rule of thumb: $abs(r_{ij}) > 0.8 \Longrightarrow$ severe MC
  - Sufficient condition
- Variance inflation factors: $VIF(\hat{\beta}_j) = (1 - R_j^2)^{-1}$
  - Rule of thumb: $VIF(\hat{\beta}_j) > 5 \Longrightarrow$ severe MC
  - Necessary and sufficient condition

Solutions

- Do nothing
- Get a larger sample
- Transform variables (e.g., ratios, first-differences, etc.)

- Drop a variable

Application

- Earnings regression