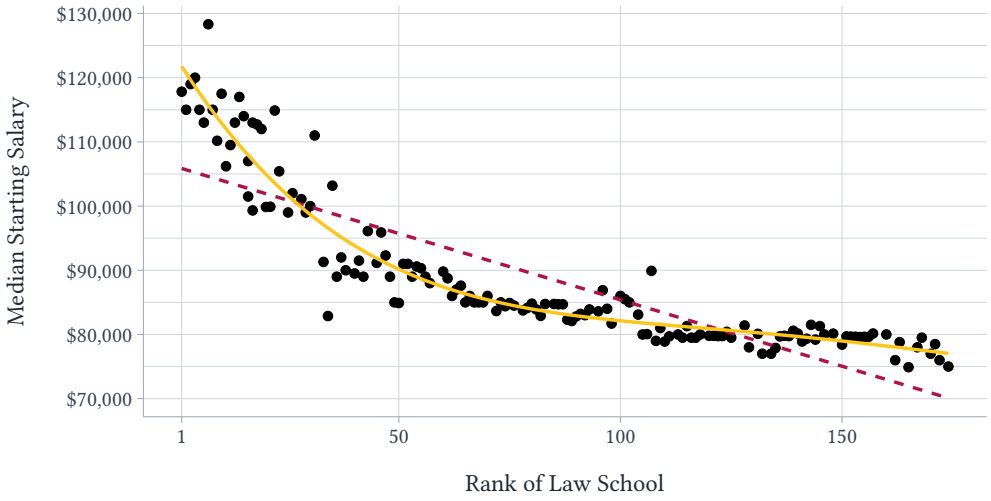
Midterm 1 - Fall 2024

ECON 4753 — University of Arkansas

1. Say you have a sample of 100 companies where you observe the average wage and the number of non-managerial employees. You regress the $\log$ of average wage at a company on the number of non-managerial employees and estimate a coefficient of $\hat{\beta}_1 = 0.005$. Interpret this coefficient estimate in words.

2. Below is a graph using data from law schools. Along the X axis is the rank of the law school (1 is best) and along the Y axis is the median starting salary for graduates. On the chart, I have ploted estimates from a linear regression of Y on X and a fourth-order polynomial of X.
    i. How would I evaluate which model performs 'better' on this sample?
    ii. Describe which of the two models you would use if your goal is predicting median starting salary given the rank of a law school?
    iii. Why might someone want to use the linear model in this context?



3. Continuing with the law school example, say we regress salary on an intercept and an indicator being a top 25 ranked program (=1 if ranked in top 25, =0 otherwise). We estimate a coefficient of 27177 and a standard error of 1528.

i. Can you reject the null that top 25 ranked law schools do not earn more than other law schools?

4. Continuing with the law school example, the regression model estimate is as follows:

```
OLS estimation, Dep. Var.: salary
               Estimate  Std. Error   t value   Pr(>|t|)
(Intercept)  106063.518   1405.0819   75.4856  < 2.2e-16 ***
rank           -206.731     12.5843  -16.4278  < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

i. Interpret the coefficient on a law school's `rank`

ii. Form a 95% confidence interval for the rank coefficient (the critical value of the middle 95% is ± 1.96).

5. Continuing with the law school example, schools can be broken up into 4 US regions: Northeast, South, Midwest, and the West. We want to see if different regions have different starting salaries. We regress median starting salaries on dummies for each region (excluding one)

```
OLS estimation, Dep. Var.: salary
                    Estimate Std. Error   t value  Pr(>|t|)
(Intercept)        88366.52    2143.09 41.233212 < 2.2e-16 ***
region::Northeast   3874.39    3097.83  1.250681   0.21308
region::South      -4025.82    2499.87 -1.610412   0.10950
region::West        1568.09    2828.93  0.554307   0.58023
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

i. What is the omitted group in this case?

ii. What is the average median starting salary for lawyers who went to school in the West?