EDS241: Assignment 3

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1 Read in Sardines Data

```
sardines <- read.csv(here("data","EU_sardines.csv"))
```

2 Homework Questions

2.1 a.) Estimate a bivariate regression of log(volume_sold_kg) on log(price euro_kg). What is the price elasticity of demand for sardines? Test the null hypothesis that the price elasticity is equal to -1.

```
#transform  variables to generate log values
sardines <- sardines %>%
  mutate(log_vol_sold_kg = log(volume_sold_kg),
         log_price_euro_kg = log(price_euro_kg))
```

```
vol_on_price <- lm_robust(log_vol_sold_kg ~ log_price_euro_kg, data = sardines)
```

```
vol_on_price_table <- tidy(vol_on_price)
```

```
vol_on_price_table %>%
  select(term, estimate, std.error, p.value, conf.low, conf.high) %>%
  kable()
```

term	estimate	std.error	p.value	conf.low	conf.high
(Intercept)	7.759061	0.0430246	0	7.674709	7.843413
log_price_euro_kg	-1.545335	0.0781254	0	-1.698505	-1.392166

Based on the confidence interval for the linear regression, we can say with 95% confidence that the coefficient on volume sold in kilograms price elasticity, beta 1 (?) is contained by the range -1.69 and -1.39. This means we can reject the null hypothesis that price elasticity is equal to -1.

2.2 b.) Like in Lecture 8 (see the IV.R script), we will use wind_m_s as an instrument for log(price_euro_kg). To begin, estimate the first-stage regression relating log(price_euro_kg) to wind_m_s. Interpret the estimated coefficient on wind speed. Does it have the expected sign? Also test for the relevance of the instrument and whether it is a "weak" instrument by reporting the proper F-statistic.

```
#first stage regression
wind_price_mod <- lm_robust(log_price_euro_kg ~ wind_m_s, data = sardines)

wind_price_table <- tidy(wind_price_mod)

wind_price_table %>%
  select(term, estimate, std.error, p.value, conf.low, conf.high) %>%
  kable()
```

term	estimate	std.error	p.value	conf.low	conf.high
(Intercept)	-0.3048875	0.0273093	0	-0.3584290	-0.2513461
wind_m_s	0.0673459	0.0055995	0	0.0563677	0.0783240

The estimated coefficient on wind speed is 0.07, which tells us that for each 1 m/s increase in wind speed, the price of sardines in euros per kilogram increases by .7 euros.

I think that this does have the expected sign (positive) because I would expect demand for sardines to increase as wind speed increases which would negatively impacting supply. Wind speed does not impact demand for sardines, but the supply (ie demand is the same, but there are fewer sardines, and the price is driven up).

```
# F-test for non-weak and relevant instruments (Lecture 9, slides 13-14)
wind_hypothesis <- linearHypothesis(wind_price_mod,
                                    c("wind_m_s = 0"),
                                    white.adjust = "hc2")

wind_hypothesis_table <- tidy(wind_hypothesis)

wind_hypothesis_table %>%
  kable()
```

res.df	df	statistic	p.value
3987	NA	NA	NA
3986	1	144.6526	0

The F statistic is 144.65 in the case of this first stage regression. This means that the instrument is not weak becuase it is greater than 10.