PS 5, Q3

$$s^2 = \frac{1}{n-k} \Sigma \hat{e}_i^2$$

$$\Sigma (X_i - \bar{X})^2$$

$$se(\hat{\beta}) = \sqrt{\frac{s^2}{\Sigma x_i^2}}$$

$$\left.\begin{aligned} q^s &= \alpha_2 p + \varepsilon^s \\ q^D &= \beta_2 p + \beta_3 y + \varepsilon^D \end{aligned}\right\}$$ practice turning this into the reduced form)

$$q^s = q^D$$

Is the structural form identified? We will discuss this next week

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Instrumental variables are sneaky ways of solving endogeneity problem.

Suppose x causes y and y causes x. Want some z related to x but not to y. z is an instrumental variable.

$$price = \gamma_0 + \gamma_1 packs + \varepsilon$$

There are endogeneity problems here.

$$price = \alpha_0 + \alpha_1 tax + e$$

$\widehat{price}$ is the component of price explained by taxes (exogenous)

$$\widehat{price} = \hat{\alpha}_0 + \hat{\alpha}_1 tax$$

$$packs = \beta_0 + \beta_1 \widehat{price}$$

you can't use those standard errors to test significance

(*) How do we do IV estimation with matrices?

Omitted variable bias - see handout