

Title

Subtitle

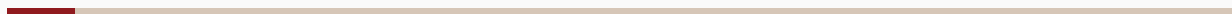


Authors

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University of Copenhagen

First section





Wow, this is a slide.

The music experience has been cancelled.



This quote is from the Severance TV-show

Example: pinit (2)



Equation written out directly (for comparison):

$$\frac{q_t^* p_t}{(1+r)^t} \geq C_0 + \sum_{i=1}^T \frac{c_i}{(1+r)^i}$$

Laid out with pinit:

Optimal quantity of goods produced

Present value of future operating costs

$$\frac{q_t^* p_t}{(1+r)^t} \geq C_0 + \sum_{i=1}^T \frac{c_i}{(1+r)^i}$$

Discount factor for time t

Paragraph after the equation.

Definition 1 Lorem ipsum dolor sit amet.¹

Theorem 2 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat.

Proposition 3 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat.

Lemma 4 Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat.

¹You can tweak colors to your own liking by specifying `#thc.definition(fill: uc.colors.ucph-light.green)`

The OLS estimator

For a multiple linear regression model, the equation can be written in matrix form as:

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}$$

where:

- \mathbf{y} is an $n \times 1$ vector of observed dependent variables.
- \mathbf{X} is an $k \times (k + 1)$ matrix of independent variables (including a column of ones for the intercept).
- $\boldsymbol{\beta}$ is a vector of unknown coefficients.
- $\boldsymbol{\varepsilon}$ is an $n \times 1$ vector of error terms.

Implying we have a vector of residuals given by:

$$\boldsymbol{\varepsilon} = \mathbf{y} - \mathbf{X}\boldsymbol{\beta}$$

Our objective is to minimize the sum of squared residuals:

$$\begin{aligned}\min_{\boldsymbol{\beta}} \boldsymbol{\varepsilon}^T \boldsymbol{\varepsilon} &= (\mathbf{y} - \mathbf{X}\boldsymbol{\beta})^T (\mathbf{y} - \mathbf{X}\boldsymbol{\beta}) \Leftrightarrow \\ &= \underbrace{\mathbf{y}^T \mathbf{y}}_{\perp \boldsymbol{\beta}} - \mathbf{y}^T \mathbf{X}\boldsymbol{\beta} - \boldsymbol{\beta}^T \mathbf{X}^T \mathbf{y} + \boldsymbol{\beta}^T \mathbf{X}^T \mathbf{X}\boldsymbol{\beta} \Leftrightarrow \\ &= -2\boldsymbol{\beta}^T \mathbf{X}^T \mathbf{y} + \boldsymbol{\beta}^T \mathbf{X}^T \mathbf{X}\boldsymbol{\beta}\end{aligned}$$

Note: By multiple a vector with itself transposed with just a scalar, or in this case $\boldsymbol{\varepsilon}^T \boldsymbol{\varepsilon}$ which is the sum of squared error terms.

$$\frac{\partial}{\partial \boldsymbol{\beta}} (-2\boldsymbol{\beta}^T \mathbf{X}^T \mathbf{y} + \boldsymbol{\beta}^T \mathbf{X}^T \mathbf{X} \boldsymbol{\beta}) = 0 \Leftrightarrow$$

$$2\mathbf{X}^T \mathbf{X} \boldsymbol{\beta} = 2\mathbf{X}^T \mathbf{y} \Leftrightarrow$$

$$\mathbf{X}^T \mathbf{X} \boldsymbol{\beta} = \mathbf{X}^T \mathbf{y} \Leftrightarrow$$

Multiply both sides with $(\mathbf{X}^T \mathbf{X})^{-1}$:

$$\underbrace{(\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{X}}_{=I} \boldsymbol{\beta} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{y} \Leftrightarrow$$

$$\hat{\boldsymbol{\beta}} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{y}$$

Definition 5 The OLS estimator

$$\hat{\beta} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \mathbf{y}$$

Important

- This is very important.
- Remember this.

Touying equation with pause:

$$f(x) =$$

Touying equation is very simple.

Touying equation with pause:

$$f(x) = x^2 + 2x + 1 =$$

Touying equation is very simple.

Touying equation with pause:

$$f(x) = x^2 + 2x + 1 = (x + 1)^2$$

Touying equation is very simple.

At subslide 1, we can
use `\setlength` for reserving space,
use `\noindent` for not reserving space,
call `\only` multiple times σ for choosing one of the alternatives.

At subslide 2, we can

- use `#uncover` function for reserving space,
- use `#only` function for not reserving space,
- use `#alternatives` function ✓ for choosing one of the alternatives.

At subslide 3, we can

- use `#uncover` function for reserving space,
- use `#only` function for not reserving space,
- use `#alternatives` function ✓ for choosing one of the alternatives.

If you have “animations” in your presentation, you can set “handout” to “true” in the config and only include the last subslide.

```
#import "@preview/ucph-nielsine-touying:0.1.1" as uc
#import "@preview/touying:0.6.1" as ty
show: uc.ucph-metropolis-theme.with(
  // ...
  ,
  ty.config-common(handout: true)
)
```

First column.

Second column. Schelling ([1971](#))¹

¹a footnote

Colors



Colors of the University of Copenhagen can be retrieved by specifying:

```
#import "@preview/ucph-nielsine-touying:0.1.1" as uc
// Darks
uc.colors.ucph-dark.red // the default dark red color of UCPH
// Medium
uc.colors.ucph-medium // ...
// Light
uc.colors.ucph-light // ...
```

Dark red #901a1e	Dark blue #122947	Dark petroleum #0a5963	Dark green #39641c	Dark grey #3d3d3d
Red #c73028	Blue #425570	Petroleum #197f8e	Green #4b8325	Grey #666666
Light red #db3b0a	Light blue #bac7d9	Light petroleum #b7d7de	Light green #becaa8	Light grey #e1dfdf

Wake up!

Wake up with a gradient!

Schelling, T.C. (1971) “Dynamic models of segregation,” *Journal of mathematical sociology*, 1(2), pp. 143–186.

Appendix

- If you look at the bottom right, the page counter starts with “A-” as this is an appendix.

Page anatomy

Header

Margin →

Content

Footer