Regression and Qualitative Data

Data Analysis for Journalism and Political Communication
(Fall 2025)

Prof. Bell

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Confounder

A variable that explains change in both the independent and dependent variable.

  - When we fail to account for confounders, we face **omitted variable bias** and our estimates are not accurate.

In-Class Example

Linear regression is just the best fit line through a scatter plot of two or more variables.

Estimating the Regression (Best Fit) Line

The linear regression equation is:

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Y = dependent variable
β_0 = intercept
β_1 = slope, also called a coefficient
X = independent variable
ϵ = error

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In-Class Example

The lm() function calculates the intercept and slope for the linear regression equation.

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You want to estimate the effect of income on the allocation to welfare applicants. The linear regression equation is:

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So the coefficient (β_1) is the effect of a **one-unit** change in income (thousands) on the mean allocation.

What Is Error?

Recall that the linear regression equation is:

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Y = dependent variable
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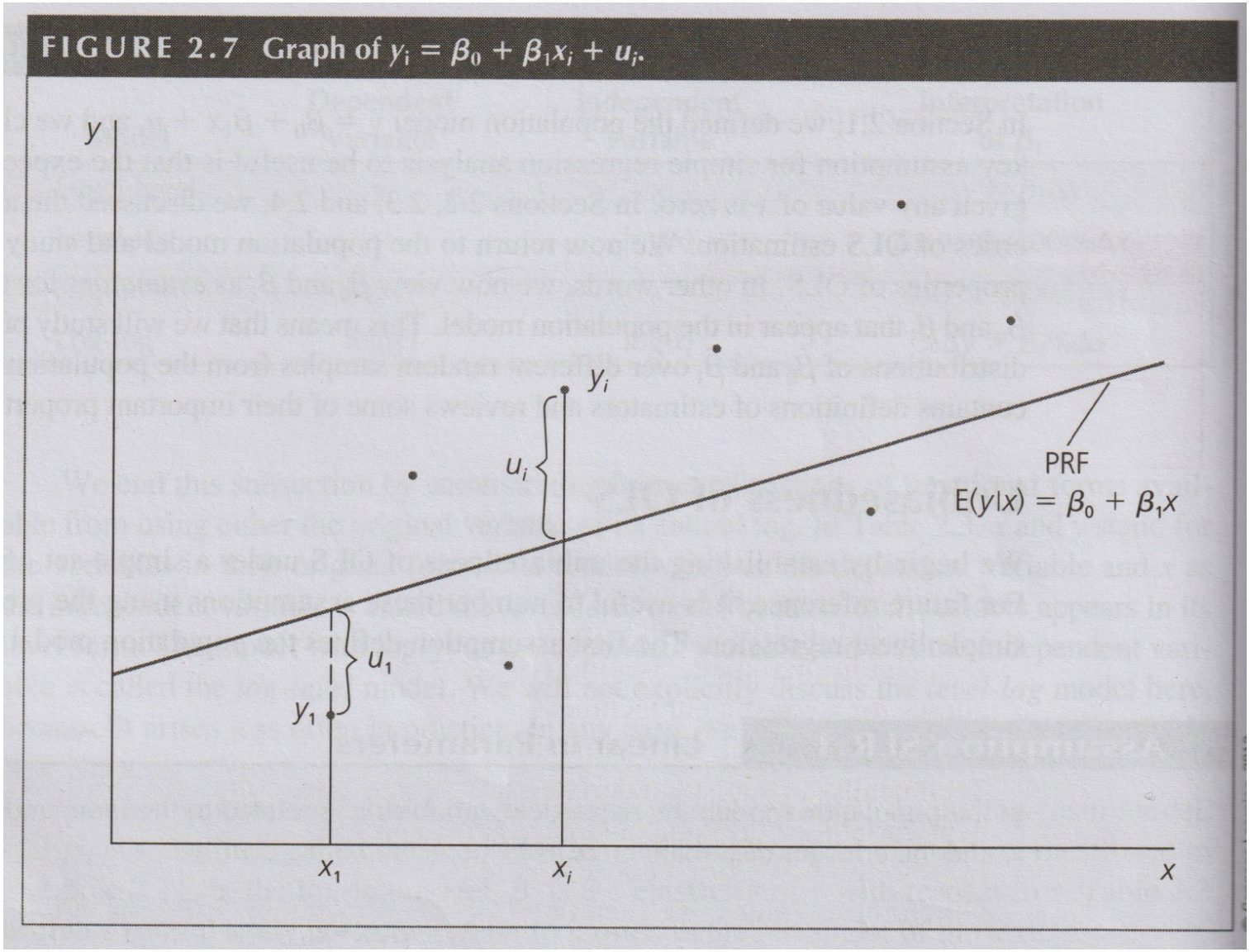
What Is Error?

- Error (ϵ or u) is also called the residual (left over from $Y = \beta_0 + \beta_1 X$, our best fit line)

What Is Error?



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- Our goal in regression is to fit the best line that minimizes the error
- However, we can never get the $\epsilon = 0$, and often we don't even get close. We just do the best we can to make the "best" best fit line.

Multiple Linear Regression

The multiple linear regression equation is:

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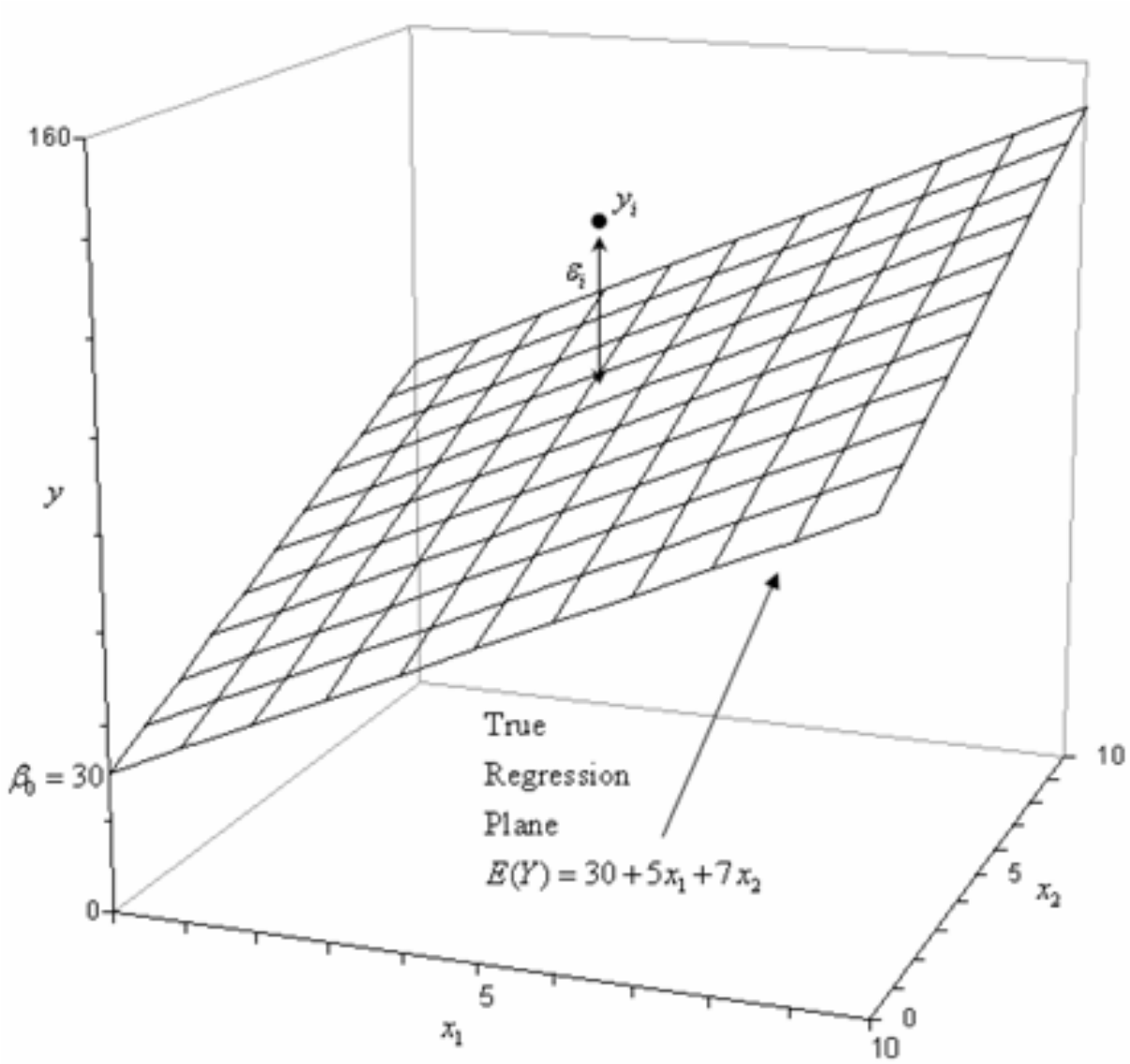

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What is the interpretation of β_1?

β_1 is the effect of a one-unit change in X_1 on the mean of Y, holding X_2 constant (the independent effect of X_1 on Y)

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What is the interpretation of β_2?

β_2 is the effect of a one-unit change in X_2 on the mean of Y, holding X_1 constant (the independent effect of X_2 on Y)

Non-Continuous Dependent Variables

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- One of the assumptions of linear regression is that the relationship between *X* and *Y* is linear (you can draw a best fit line)
- This assumption is usually fine when we are working with continuous dependent variables like income
- What about categorical dependent variables, like party ID? The linear regression model is not well suited for these.
- What about binary dependent variables, like support for a policy?

  We call this a linear probability model because it estimates the effect of a one-unit change in *X* on the *probability* (percent chance) of a value of "1" for the dependent variable

In-Class Example

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- We will focus on one type of qualitative analysis: text analysis

Text Analysis

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Text Analysis

Well, that's one problem, that [my school is] pretty small, so 1 if you say one thing to one person, and then they decide to tell two people, then those two people tell two people, and in one period everybody else knows. 2 Everybody in the entire school knows that you said whatever it was. So. . . .

[1] SPREADING RUMORS
[2] KNOWING WHAT YOU SAID

Text Analysis

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  - News articles or social media posts
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- The most common way to analyze qualitative data is **thematic coding**
- A **code** is just a descriptive label applied to a piece of text
- We can then quantify our codes: how frequently each code appears, in which parts of the text, from which speakers, etc.

Where Do Codes Come From?

- **Deductive Coding:** You start with a list of codes *before* you read
  - This is most often used when the goal of the study is to count the appearances of a discrete set of themes, e.g., "How often does Donald Trump talk about trade in his speeches?"

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- Most studies begin with a short list of deductive codes, then refine those codes or add new ones as you explore the data

In-Class Exercise

From StoryCorps:

In February of 2012, Jamal Faison was a 20-year-old college sophomore home on school break in New York City when he, along with two others, were arrested for attempting to steal mobile devices from a subway rider. Transit police arrested Jamal and he spent the next eight months on Rikers Island — New York City's massive main jail complex.

In September 2012, Jamal pleaded guilty to grand larceny and attempted robbery charges and a month later was released from custody. Jamal came to StoryCorps to remember the night he was released from Rikers, and to discuss his relationship with his uncle, Born.

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  - As if you are putting all the words into a bag, drawing them out at random, and seeing how frequently they occur

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- The researcher must decide what the semantic meaning of these topics (correlated words) mean

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   - Is that topic “The Economy”? Or “Labor Market Reports”? Or “Political Talking Points”?
   - The researcher must interpret and label the topic. This is a subjective, human step!

In-Class Exercise

- Data at: Kaggle.com
- Tool: Voyant