

Lecture 25: Linear Regression Part II

Chapter 7.2-7.4

Questions for Today: Example From Text

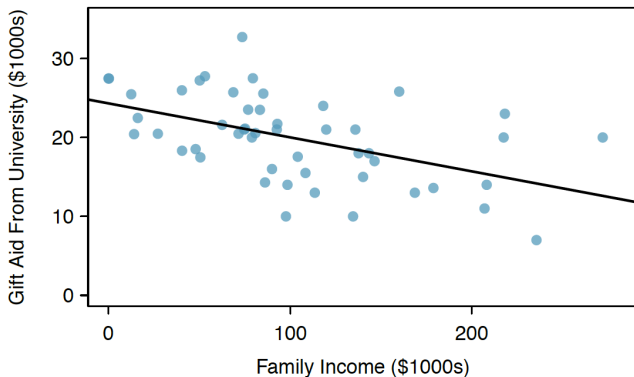
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- ▶ Explanatory variable: family income
- ▶ Outcome variable: gift aid



Questions for Today: Example From Text

Using these values,

	family income in \$1000's (x)	gift aid in \$1000's (y)
mean	$\bar{x} = 101.8$	$\bar{y} = 19.94$
sd	$s_x = 63.2$	$s_y = 5.46$
	$R = -0.499$	

Point Estimates of Intercept

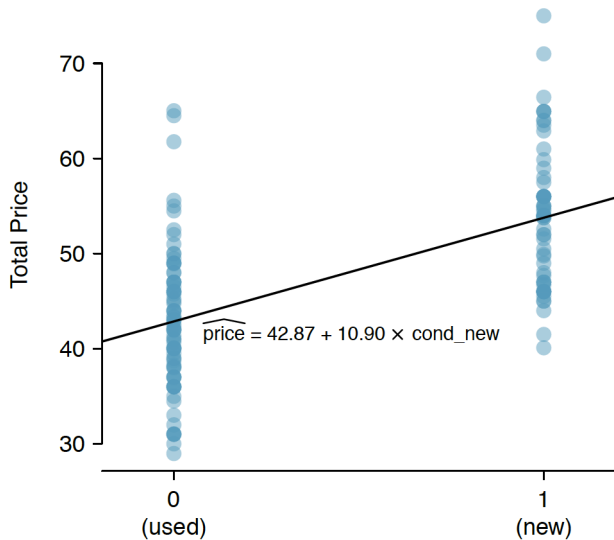
Point Estimates of Slope

Extrapolate with Care

Extrapolation: extend the application of a method or conclusion to an unknown situation by assuming that existing trends will continue or similar methods will be applicable.

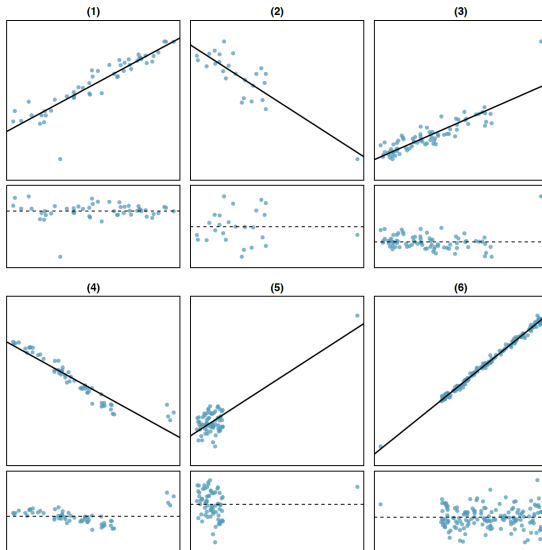
Categorical Predictor x With Two Levels

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Types of Outliers in Linear Regression



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Especially in cases 3 and 5, the outliers seem to be pulling the least-squares line towards them.

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Points that fall horizontally away from the center of the cloud tend to pull harder on the line, so we call them points with high **leverage**, i.e. large influence.

Simple Linear Regression Regression Table

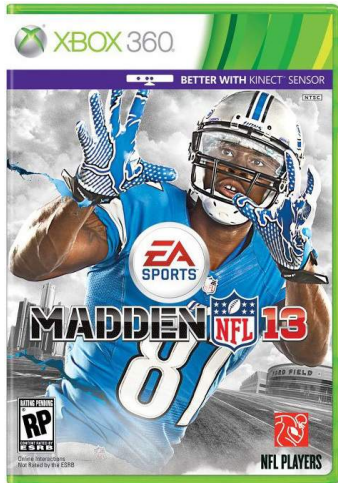
eBay price of old vs new Mario Kart using $n = 141$. On page 355:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	42.87	0.81	52.67	0.0000
cond_new	10.90	1.26	8.66	0.0000
	$df = 139$			

Confidence Interval and Hypothesis Test for β_1

Concept: Regression to the Mean

The Madden Curse. Many NFL players who feature on the cover of the video game Madden end up having subpar subsequent years, leading many to believe there is a curse.



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So while it looks like a curse, it is just players reverting back to their “mean” level of performance.

Next Time

Multiple Regression: As opposed to **simple linear regression** where there is only one predictor/explanatory variable x , we now consider **many** predictors x_1, x_2, \dots