

Lecture 1: Introduction

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Introduction

- Instructor: Yuta Toyama
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 - Office: Building 3-1233
 - Office hours: Wednesday 11:50-12:50
- Background:
 - Undergraduate in Economics at Kyoto
 - Master in Public Policy & Economics at U-Tokyo
 - Ph.D. in Economics at Northwestern
- Field: Industrial Organization, Empirical Microeconomics
 - Topics: Merger policy, Environmental regulations, Voting behavior

Course Description and Requirement

- Go to syllabus

Theme of this course: Causal Inference

- Causality: **X** causes/affects/impacts **Y**
- Many questions in economics & political sciences are causal!
 - How much does **an additional year of schooling** increase your **wage**?
 - How does **online advertisement** affect **sales of products**?
 - Do **mergers** between firms increase **product prices**?
 - Does **democracy** cause **economic growth**?
 - Does **higher turnout** benefit **Democrats** in presidential election?
- Causal inference: Use data to infer the causal effects of A on B
 - Does the effect exist?
 - Sign of the effect?
 - How large is the effect?

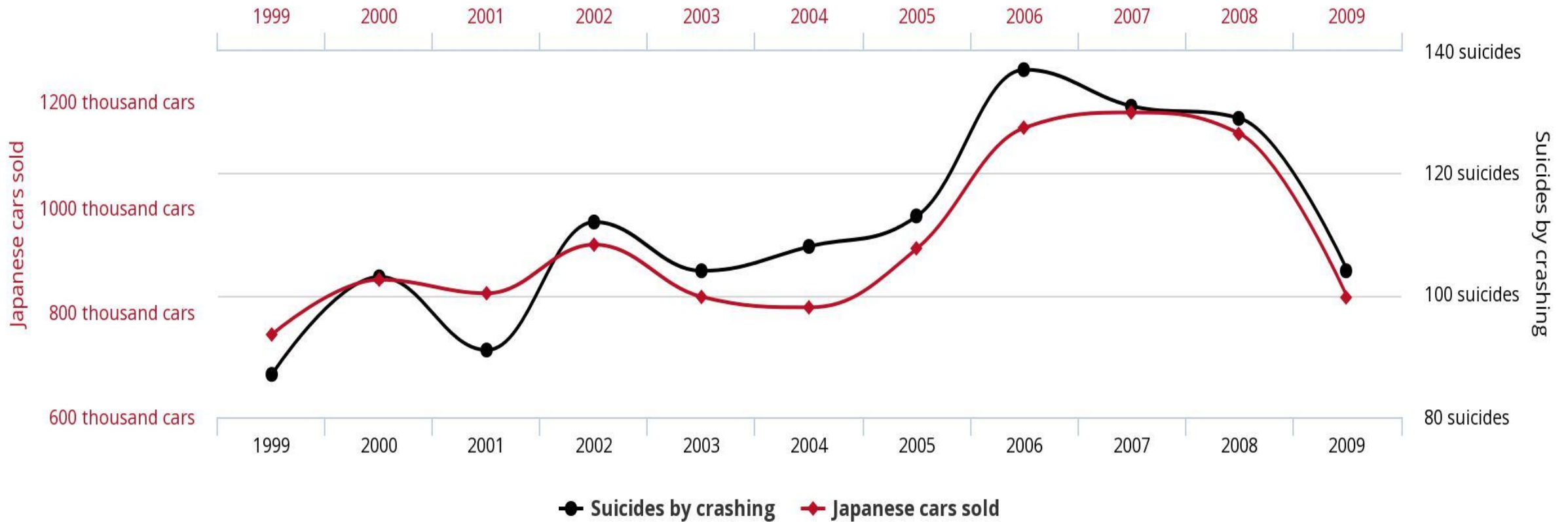
Does correlation of X and Y imply causality?

- Collect data on X and Y.
- Observe that X and Y are **moving together (correlated)**.
- Examples:
 - 1: Cities with many police officers have more crimes (positive correlation).
 - 2: Those who went to college earn more money by 10%.
- Questions
 - Does this mean “X causes Y”?
 - Is the magnitude of the correlation equal to that of causal effect?

Japanese passenger cars sold in the US

correlates with

Suicides by crashing of motor vehicle



tylervigen.com

Case 1: X has indeed causal effect on Y

- **This is what we want!!**



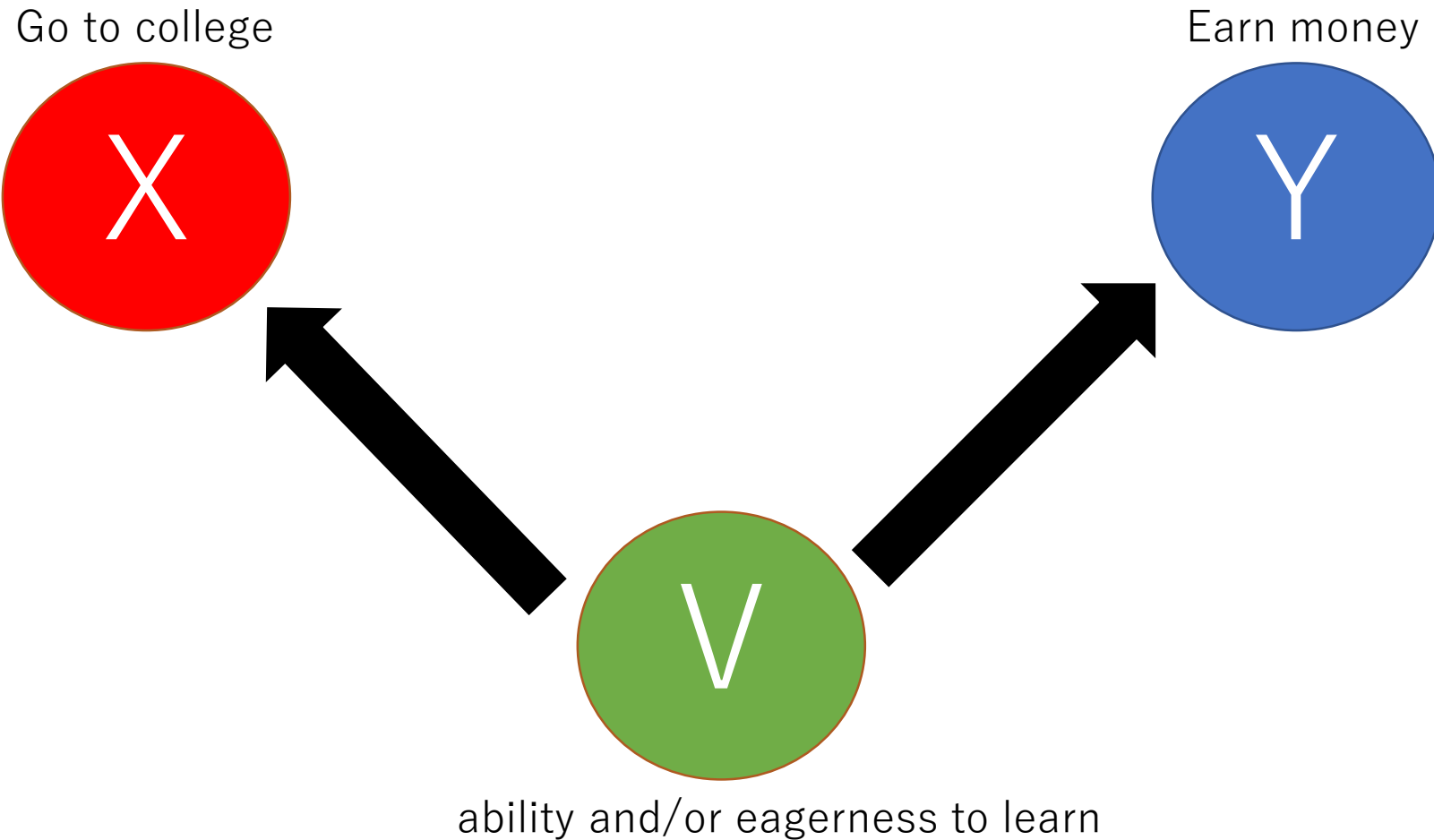
Case 2: Y has causal effect on X

- **Reverse causality**

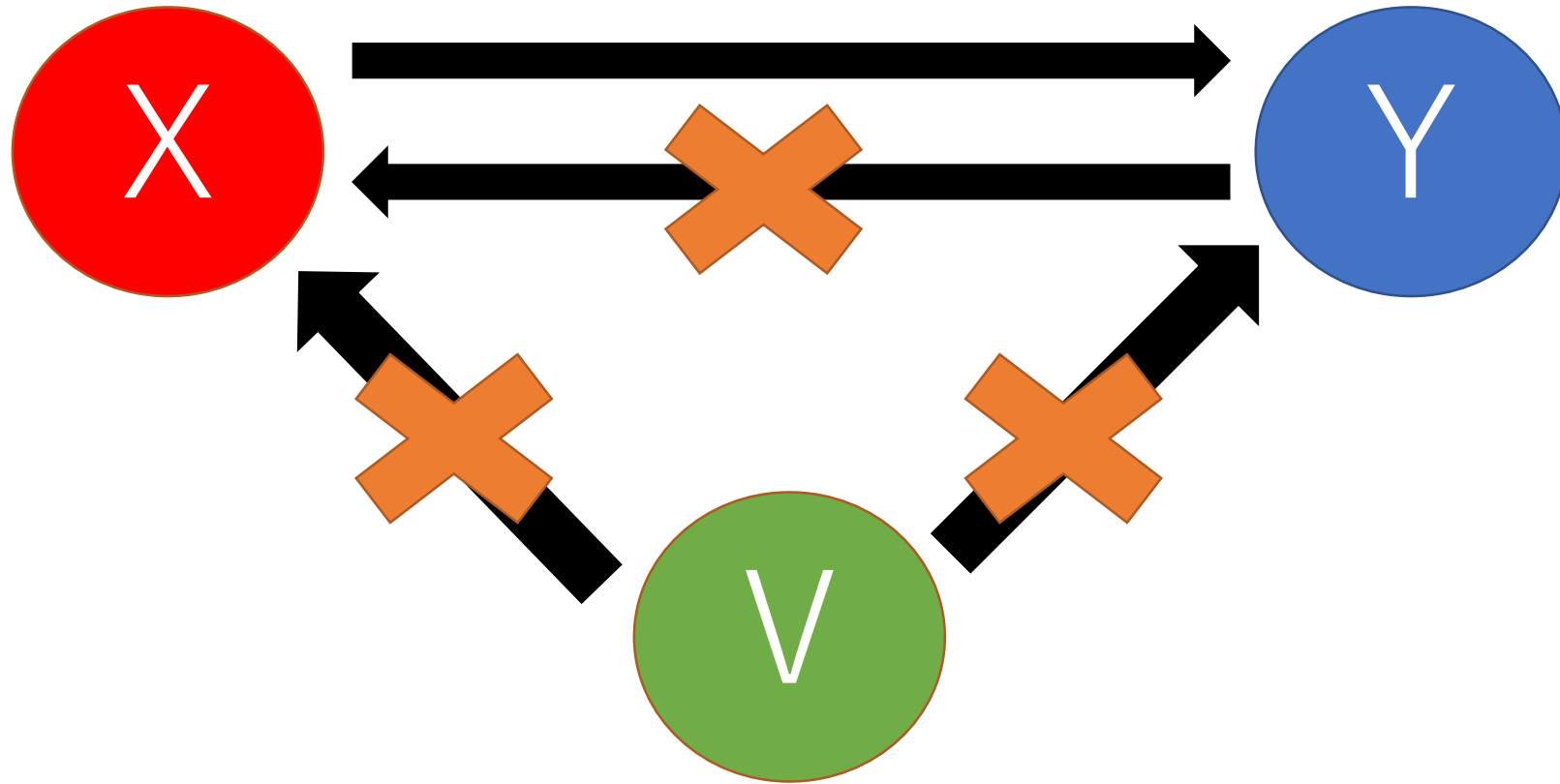


Case 3: V affects both Y and X

- **Spurious Correlation**



Need to eliminate the last two cases!!



Some Video from “Friends”

- https://www.youtube.com/watch?v=MTbZoKEOkUg&list=PLUq8yM4tK_aV6wtV50BrJ3Nk8K-TT-sym

More serious video from TED

- The danger of mixing up causality and correlation: Ionica Smeets at TEDxDelft
 - <https://www.youtube.com/watch?v=8B271L3NtAw&t=268s>

Group Exercise-What do you think?-

- Story 1: You are working as a business manager at an automobile company. The company is selling many automobile models. Using the past data on sales and advertisement, you found a negative correlation between the expenditure on a TV commercial and the sales of automobiles. Based on this finding, you suggested to your boss that the company should stop TV commercial.

- Story 2: You are a policymaker. You have to decide whether the government should continue job training program for young people. To discuss this issue, you conduct the survey to collect the data of young people on wage and experience in the program. By doing statistical analysis, you found that those who participated in job training programs earn more money than those who did not. Then, you made a policy proposal that “the government should expand this program more!!”.

Some recommendation for reading

- Steven Levitt and Stephen Dubner “Freakonomics: A Rogue Economist Explores the Hidden Side of Everything”
- (If you read Japanese) 伊藤 公一朗 “データ分析の力 因果関係に迫る思考法”