

Mathematics 231

Lecture 1

Liam O'Brien

What is Statistics?

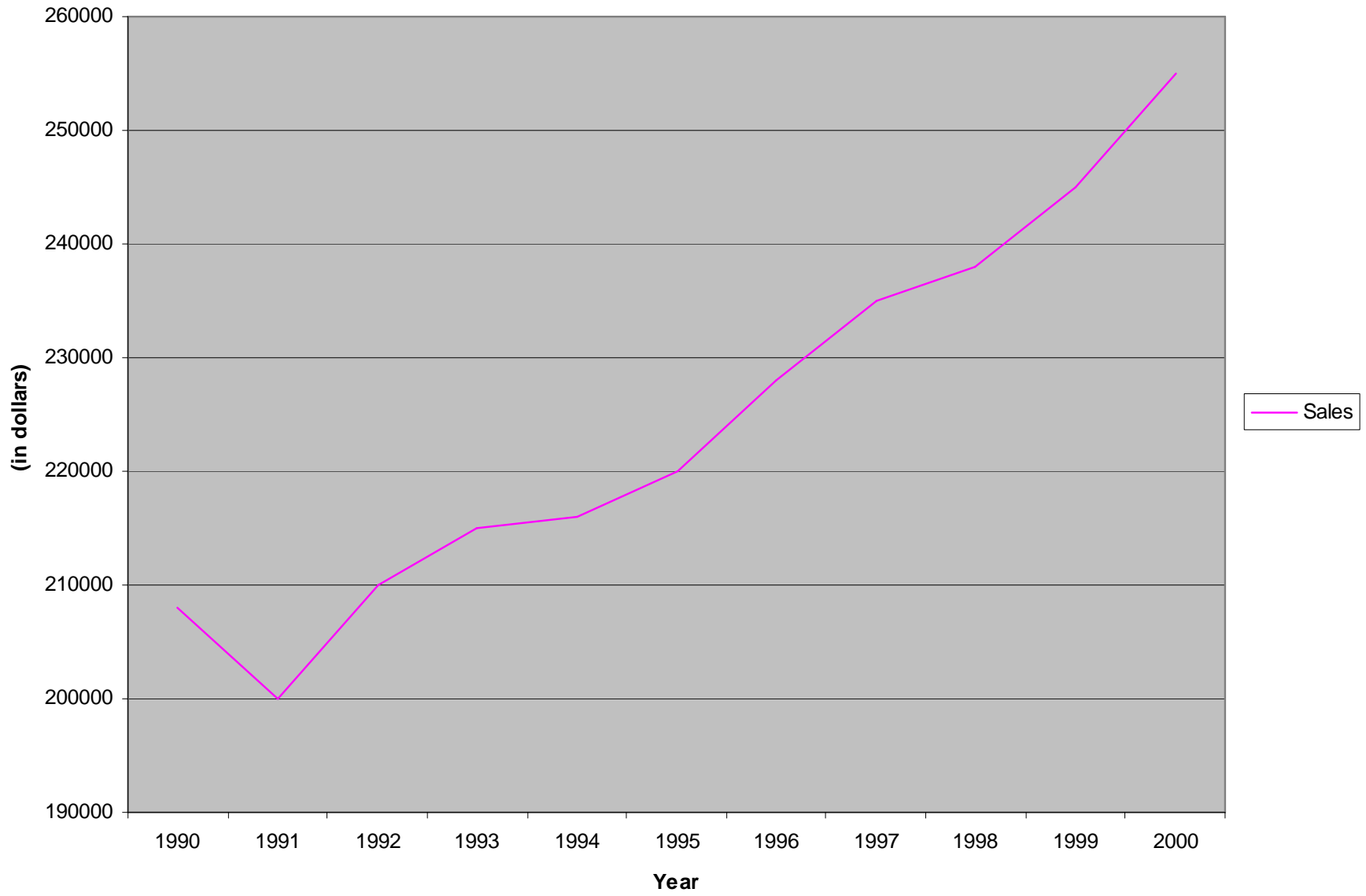
- “There are three kinds of lies: lies, damned lies, and statistics” (Benjamin Disraeli)
- Can you lie with statistics?
- Of course!
- You can also lie using English, French, etc.
- “It is easy to lie with statistics, but it is easier to lie without them” (Fred Mosteller)

How to Lie with Statistics

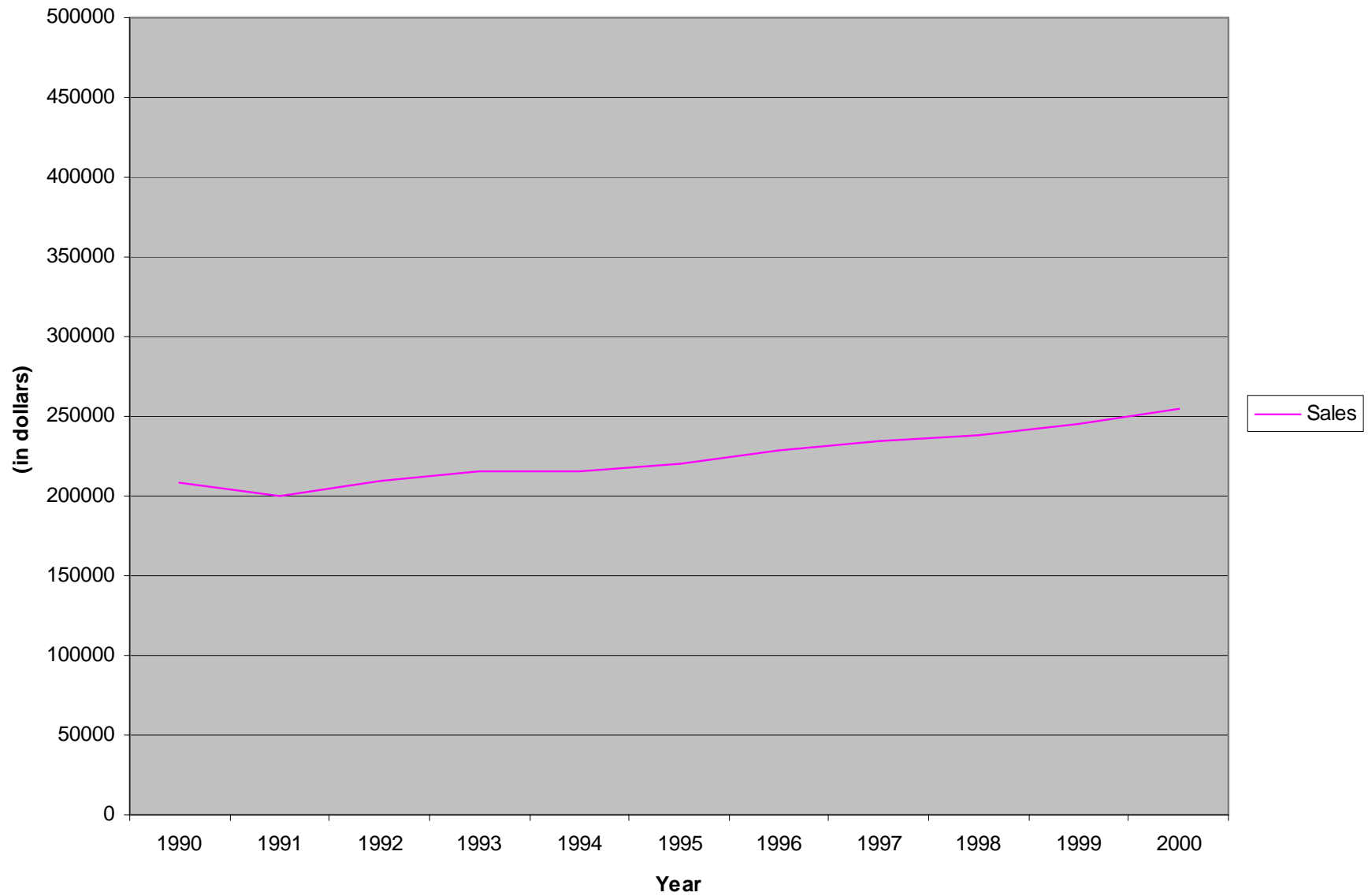
Intentional Lies

Example: Sales Data

Sales



Sales



How to Lie with Statistics

More Intentional Lies

**Half of all statistics
reported in the news are
inaccurate.**

How to Lie with Statistics

Damned Lies

**Princeton Review Ranks
Bowdoin as Having Best
Campus Dining – Colby
Ranked Seventh**

How to Lie with Statistics

Unintentional Lies

Example

Oral contraceptive use and risk of high
blood pressure

Oral Contraceptive Data

- 800 oral contraceptive users, 8.0% have high blood pressure
- 1600 not using oral contraceptive, 8.5% have high blood pressure
- Do oral contraceptives provide a protective effect against high blood pressure?

Age 18-34

	Sample Size	Number with high BP	%with high BP
Use OC	600	36	6
Don't Use OC	400	16	4

Age 35-49

	Sample Size	Number with high BP	%with high BP
Use OC	200	28	14
Don't Use OC	1200	120	10

What is Statistics?

- Does statistics = mathematics?
- Statistics uses mathematics, but is its own entity.
- Statistics is closer to science than mathematics.
- Statistics is just as important to as mathematics is to physics.
- It is a tool of science – both social and natural – used for evaluating scientific evidence

What is Statistics?

- Collecting Data
- Describing Data
- Drawing Conclusions from Data

What are Data?

Are they numbers?

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Data: Numbers with context/meaning

What is MA231 about?

An introductory course in statistics that emphasizes applying statistical methods to data. We will focus a little more on linear regression than a standard introductory class, however, at the expense of covering experimental design and probability in as much detail as a standard introductory course.

“...statistical reasoning will one day be as important to good citizenship as the ability to read and write.”
H.G. Wells

Araya., et al. (2006). Inequities in Mental Health Care After Health Care System Reform in Chile. *American Journal of Public Health*

Objectives. We compared differences in mental health needs and provision of mental health services among residents of Santiago, Chile, with private and public health insurance coverage.

Methods. We conducted a **cross-sectional survey** of a **random sample** of adults. Presence of mental disorders and use of health care services were assessed via **structured interviews**. Individuals were classified as having public, private, or no health insurance coverage.

Results. Among individuals with mental disorders, only 20% (95% confidence interval [CI]= 16%, 24%) had consulted a professional about these problems. A clear mismatch was found between need and provision of services. Participants with public insurance coverage exhibited the highest prevalence of mental disorders but the lowest rates of consultation; participants with private coverage exhibited exactly the opposite pattern. After adjustment for age, income, and severity; of symptoms, private insurance coverage (odds ratio [OR]= 2.72; 95% CI = 1.6, 4.6) and higher disability level (OR = 1.27, 95% CI = 1.1, 1.5) were the only factors associated with increased frequency of mental health consultation.

Conclusions. The health reforms that have encouraged the growth of the private health sector in Chile also have increased risk segmentation within the health system, accentuating inequalities in health care provision.